COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper | Second-class postage paid at Boston, Mass., and additional mailing offices

2/year | December 10, 1975 | Vol. IX, No. 50

NEWSPAPER

CW News Update

Bid Case Defendents To File for Dismissal

By Nancy French
Of the CW Staff

JERSEY CITY, N.J. – Defendants in a case in which an IBM employee and various city officials were charged with conspiracy to thwart competitive bidding on a computer contract [CW, Oct. 8] will ask for dismissal of the charges here soon.

Sources close to the conspiracy case said the defense will file the motion asking for dismissal of grand jury charges on grounds of "selective prosecution."

A story published recently by the *Jersey Journal* said the motion will contend that Jersey City is not required to have public bidding on its computer services contracts and therefore cannot be guilty of violating bidding statutes.

To support the motion, the defense will note that neither Bayonne nor Hudson County solicited bids for their computer systems, yet neither was prosecuted.

A Hudson county grand jury indicted IBM, one of its employees, five city offi-

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Jurisdiction Question Stalling U.S. vs. AT&T

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – While the trial of the government's antitrust suit against IBM has managed to get off the ground in the course of this year, U.S. vs. AT&T et. al. may never fly.

Filed a little more than a year ago on Nov. 20, 1974, the government's action – which charges the Bell System with monopolizing the telecommunications common carrier industry – has not progressed beyond the question of whether the U.S. District Court for the District of Columbia here has the right to hear the case.

First raised by the judge hearing the suit last February, this question of jurisdiction has been the only topic for public discussion during 1975.

Judge Joseph C. Waddy asked whether this district court could try the case since a similar action hrought by the government against the Bell System in 1949 was terminated by a consent judgment in 1956 in the U.S. District Court for the District of New Jersey.

In addition to wondering if the New Jersey court should hear the present case as well, Waddy suggested the Federal Communications Commission (FCC) and other state regulatory bodies might have jurisdiction over these matters rather than

(Continued on Page 2)

Car Listed as Stolen

Man Killed After DP Crime Check

By Nancy French
Of the CW Staff

TALLAHASSEE, Fla. – A Brevard County official on the way to his father's funeral was shot and killed near here recently by a Florida state trooper who mistook his car for a stolen vehicle after checking with the state's crime computer.

The victim's auto bore a license number identical to another issued for the year 1971 which was still in the state's active stolen vehicle data base.

Such numerical duplications are routine here because new tags with the same numbers but different colors are issued to different drivers every year, officials said.

Trooper Robert Rennie Jr. did not realize the "hot" tag was a 1971 number, not one valid for 1975, observers said.

Information is being withheld in the case pending the outcome of a coroner's inquest to determine whether charges should be brought against the trooper, but some details are available.

When Rennie spotted him, Frank D. Booth, the victim, was parked on the shoulder of the highway, apparently composing himself in the face of his grief over his father's death, according to an associate at the Brevard County Emergency Employment office, where Booth was director.

The trooper radioed a routine inquiry on Booth's license tag number via his two-way radio to a radio dispatcher with access to the state's criminal justice information system.

The computer printout produced at the dispatcher's terminal indicated a car with that tag had been stolen in 1971. The record also provided such data as the Vehicle Identification Number (manufacturer's serial number), the year, make and model of the stolen automobile, its color, number of doors, state of registry, date stolen and the date the record was entered.

Although Booth's car was a recently purchased 1975 Chrysler with an orange-on-white license plate issued in 1974 and validated with a 1975 decal, Rennie believed the car to be stolen and approached the vehicle with his .38 caliher magnum pistol loaded and cocked, according to Patrol Commander Eldridge Beach. In the confusion that ensued, Booth was shot and killed.

Tag Year Important

In Florida, vehicle identification is determined not only by tag number, but also by the year the tag was issued. The year is indicated by the color of the plate, according to Ralph Davis, director of the state's Department of Highway Safety

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Tandem Multiprocessor System Designed for 'Nonstop' Operation

By Patriek Ward
Of the CW Staff

SANTA CLARA, Calif. – Tandem Computers, Inc. said it has an answer for transaction-oriented network users who feel they have to install dual mainframes to make sure their network will stay up.

Tandem has developed a modular, multiprocessor system designed to support up to 1,000 terminals without interruption, even if some of its components fail, the company said. The system will interface with terminals selected by the user.

Priced from $65,000 to $1 million, the Tandem 16 Nonstop system is said to cost less than pairing two mid-scale computers and comes with a prewritten, general-purpose operating system, a spokesman said.

The system is intended for sophisticated users who will write their own applications software in a higher level language, he added. An alternative approach would be to use a third-party applications software vendor.

Nonstop is an assembly of modules "configured so that whenever any one module that is necessary to assure Nonstop operation fails, there is a redundant module to take over automatically," the spokesman noted. The user can expand the Nonstop system without rewriting application software, he added.

A Nonstop system can consist of two to 16 32K 16-bit processors interconnected

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Study That Halted N.Y. Lottery Charges DP Security Deficiencies

By Nancy French
Of the CW taff

NEW YORK – Gov. Hugh L. Carey has ordered a complete overhaul of the state lottery here and dismissed the lottery's director, Jerry Bruno, and his entire 325-person division.

The action came after a study by an independent management consulting firm found "security problems," "organizational problems" and "needless opportunities for fraud" in the lottery's operation, including the DP department.

No actual fraud was found, however.

The troubled lottery operation was suspended two months ago after it was found duplicate numbered tickets had been printed by the State Racing and Wagering Board's computer for a special Halloween drawing [CW, Nov. 18].

Arthur D. Little, Inc. (ADL) of Cambridge, Mass., which was asked by the governor to audit computer operations, identify deficiencies and recommend corrective action, cited the shortcomings of the lottery operation in a comprehensive report.

In announcing his decision, the governor said as many staff memhers as possible will be assigned to other jobs, but "in light of the state's current fiscal situation" there was no alternative to layoffs once the lottery failed to produce its own revenues.

Refunds are being made to some ticket holders, and some special drawing will be announced, he said.

The lottery will he totally reorganized along the lines of those operated in Massachusetts and some other states, and new systems analysts and computer programmers are being sought to develop the new system, Carey said.

The error that eventually brought the

(Continued on Page 3)

25 Packages Make Honor Roll

By Don Leavitt
Of the CW Staff

DELRAN, N.J. – Twenty-five packages have been named to the 1975 Software Honor Roll as a result of Datapro Research Corp.'s third annual survey of users.

Each package earned an average rating of excellent in overall user satisfaction and met other qualifying criteria, the research organization said.

Systems software dominated the list, with application-oriented packages accounting for only three of the top 25 spots. The same pattern has appeared in all three Honor Rolls Datapro has compiled.

Similarity in the Honor Rolls extended to the specific packages as well, with nine of the 25 entries appearing on the roll for the third straight year. Another five maintained the place of honor they earned first last year.

The survey form was mailed to 26,000 DP executives and invited them to rate any packages they had acquired from their mainframe vendors or from independent software houses. Just over 2,800 responded to that part of the survey, rating 1,400 packages.

The Honor Roll was put together out of those packages rated by at least six users. The rating form provided a four-point scale on a number of points including overall satisfaction, throughput/efficiency, ease of installation, ease of use, documentation and vendor's technical support.

Each of the possible ratings was assigned a weight, from 4 for excellent down to 1 for poor. The number of ratings at each level multiplied by its weight provided the weighted average for the category.

In addition to having an average overall user satisfaction rating of 3.5, each package had to have average ratings of

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
TM Reg. U.S. Pat. Off.

Phone/address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160 Phone (617) 965-5800 Telex 92-2529

OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PI. Phone (01) 485-2248/9. Telex 264737. W. Germany: Computerwelt, c/o Computerwoche GmbH, 8000 München 40, Tristanstrasse 11. Phone 36-40-36/37 Telex, 5215350. Asia: Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141 Phone (03) 445-6101 Telex 26792

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160 © 1975 by Computerworld, Inc. All rights reserved

50 cents a copy; $12 a year in the U.S.; $20 a year for Canada and PUAS; all other foreign, $36 a year. Four weeks notice required for change of address

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Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilms, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106 Phone (313) 761-4700

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.

DP-Aided Journalism Reaps $1 Million

By Patrick Ward
Of the CW Staff

ALBANY, N.Y. — Journalists and DPers on the staff of the *Knickerbocker News* here pooled their skills recently to produce a detailed series of articles on delinquent tax accounts in Albany County.

A month after the five-part series appeared, the county received over $1 million of its back taxes. This represented a "quick surge" over the previous rate of payments, according to reporter Gene Weingarten.

Without the help of the newspaper's IBM 370/125, researching the stories "would have been too time-consuming, expensive and probably impractical," according to Steve Kent, executive city editor.

The project appealed to the news staff because property owners owed the county some $20.6 million in unpaid taxes, the largest amount in the state outside of New York City.

However, the county tax records were filed by street address only on thousands of record cards. Writing the series from data in this form "would have taken months and dozens of people," Kent said.

At this point the news staff enlisted the aid of the newspaper's DP department, whose 370/125 processes the paper's payroll and other business applications.

The *Knickerbocker News* photostatically copied the public tax payment records and spent 33 man-hours keypunching the relevant data.

John L. Burns, the newspaper's manager of advanced systems, then wrote an RPG program which broke the data down into categories for reporters Weingarten and Arlene Bigos, who wrote the series.

"It allowed us to correlate all the information by people's names," Kent explained. The computer system also produced a breakdown of delinquent properties by ward so the *Knickerbocker News* could run a multicolored map showing the level of delinquencies in various areas.

Other breakdowns included lists of delinquent properties by street and town; property owners who owed more than $5,000 in delinquent taxes; and taxpayers who owed more than $100, more than $500 and more than $1,000.

The *Knickerbocker News* staff now plans more computer-aided projects, including surveys of how state legislators stand on particular issues.

With the help of the computer, the newspaper will be able to easily break down the responses to see, for example, how "Downstaters" compare with "Upstaters," on a particular issue.

This will help the newspaper's coverage of voting patterns on major state issues, Kent said.

Correction

The third paragraph of Herbert S. Bright's "Simulation Confirms Proposed Encryption Algorithm" [CW, Nov. 19] should have read:

"Unauthorized recipients of the cipher who may have the algorithm but who do not have this key cannot derive the original data. A standard algorithm based on a computer-generated key thus provides a basis for compatible cryptographic protection of computer data while preventing unauthorized use of data in cipher form."

The author, for his part, noted there are 512 entries in the "S-box" substitution cipher tables, not 256 as stated toward the end of his article.

Complete output from the test runs is availble from Computation Planning, Inc., 6400 Aberdeen Road, Bethesda, Md. 20014.

N.J. Bid Conspiracy Defendents Reported Ready to Ask Dismissal

(Continued from page 1)

cials and a bank official for "thwarting free, open and competitive bidding" and "overt acts" of conspiracy in order to win the contract for the city's computer system in violation of a New Jersey statute.

Identical Specifications

As evidence, the indictment alleged specifications in the city's request for proposal (RFP) issued on April 3, 1974, described "almost exactly" the characteristics of an IBM 370 system and related software packages.

Further, information for that RFP was provided by IBM employees interested in closing the contract, the indictment charged.

A source added that 90 items included in the 92 specifications for the new system were identical to IBM specifications.

The source said further that an IBM secretary, in secret testimony before the grand jury, said she typed the RFP under direction from an IBM salesman.

Indicted on charges of conspiracy and misconduct in office were: Peter Korn, former Jersey City business administrator; Joseph Cahill, the city's former finance director; and Walter Happell, former DP director.

Eugene Josephs of IBM and Roger Forsyth, an executive of First Jersey National Bank, were charged with obstruction of justice.

Question Stalling U.S. vs. AT&T

(Continued from page 1)

the courts, according to the Communications Act and other federal and state regulatory statutes.

When the government first filed its complaint last year, lists of companies in the telecommunications field that were to be deposed were drawn up and discovery of documents within AT&T and the government was begun. But all such discovery has been suspended pending a decision on whether the District of Columbia court has jurisdiction.

Last March, both the government and AT&T filed memoranda on the subject with the judge. The government argued Waddy and his court do have the right to hear the case under Section 88 of the Sherman Antitrust Act.

AT&T, however, contended the matter would best be decided by Congress, the FCC and state regulatory agencies. Neither party suggested the action belongs with the Federal District Court for New Jersey.

In August, the judge invited the FCC to participate as "a friend of the court" or "amicus curiae," filing a memo on the question of jurisdiction. The FCC has requested two extensions for submitting this brief.

At present, the document is due Dec. 15, and the parties have asked to file briefs in response during January.

On the Inside This Week

In Reviewing Program Error

Consultants Hit N.Y. Lottery for Poor Design, Control

By a CW Staff Writer

NEW YORK – In reviewing the program error that led to the suspension of the New York State lottery here, Arthur D. Little, Inc. (ADL) found the problem was symptomatic of a "poorly designed, implemented, controlled and managed lottery."

No single individual or organization controlled all the resources needed to operate a successful lottery, a report by ADL said.

Within the lottery division itself, there is no computer programming capability, no procurement, personnel or finance capability.

Persons who perform these functions report to the Director of Administration for the Racing and Wagering Board in New York City, rather than in Albany where the division is located.

Computer operators who work for the Department of Taxation and Finance are paid from lottery funds, report to the head of DP within the Administration Division of the Racing and Wagering Board and are supervised by DP shift supervisors who work for the Department of Taxation and Finance.

There is a general absence of written instructions for initiating computer actions and no formal review to assure instructions are implemented.

Only one individual currently understands all the computer programs used for the lottery. Suppose he left?

Decisions to introduce new lottery games were made with no analysis of the implications such steps might have in terms of operating procedures.

No "checklist" was used to review and promulgate changes in the rules and regulations before offering a new game.

Paper stock was purchased on a price-bid basis, without assurance that paper stock and inks used could not be duplicated elsewhere.

Production of counterfeit tickets requires only two things – the code, which was found to be relatively unsophisticated, and some paper stock.

The lottery's typeface is widely used and posed no problem to the would-be counterfeiter.

Identical algorithms were used for three different games. A set of "seed numbers," used to make the algorithm perform its computations for a particular set of tickets, was neither reviewed nor changed for the special games.

No "lock-out" feature was used for an extended period of time, to prevent the computer from printing unauthorized tickets.

No controls over unauthorized ticket printing were established either by using appropriate stock control or by keeping critical programs, stored on magnetic tapes and disks, out of the computer room when not in planned use.

Study Leads to Halt Of N.Y. State Lottery

(Continued from Page 1)

Oct. 22 halt of lottery operations occurred as a result of a decision to distribute only 4 million rather than the usual 5 million tickets for which the computer program had been designed and previously used, the ADL report said.

The Colossus-Halloween Special lottery number had seven digits divided among three boxes, according to the report.

Box A held one digit – the pool or series digit – which in a run of 5 million tickets ranged from one to five. In this case, since only four million tickets were being printed, the number in Box A should have been one, two, three or four.

To add still another dimension to the numbering problem, agents wanted to be able to sell players tickets from each of the four pools rather than having all their tickets from one series. To do this, the lottery devised a scheme to randomize the print order so that each agent received a packet with tickets from each of the four pools.

Although the scheme was properly executed in the prior Colossus games, it was not modified correctly for the Oct. 31 Halloween game, the report said.

On Sept. 16 a programmer employed by the Racing and Wagering Board, which provides computer services to the Lottery Division, was instructed to change the program so it could be run later that day to print 4 million tickets rather than 5 million as were previously produced.

The programmer made the changes he thought necessary and instructed the computer operator to produce the tickets.

However, he failed to modify the program instructions appropriately, which led to the assignment of the digit 5 in Box A even though there were only four pools of 1 million each produced, ADL said.

Moreover, the programmer failed to modify his key numbers for special games which led to the assignment of duplicate and triplicate numbers.

ADL said 100,000 tickets with a 5 in Box A were printed.

In addition, 900,000 duplicates (1.8 million tickets) and 500,000 triplicates (1.5 million tickets) out of the 4 million tickets were printed, according to the ADL report.

ADL Recommendations

Although it is "impossible to eliminate human error," organizations need procedures and controls that reduce the likelihood of such errors, and such controls were "virtually nonexistent" within the computer sections, the report said.

Only limited tests of the revised program were performed before the decision to print was made, and these tests were performed by the programmer himself, the report said.

The program was not reviewed by the programmer's supervisor nor by anyone else. Further, the order to print the tickets was apparently given informally by the programmer acting under the instructions of his supervisor.

Fla. Man Killed After Trooper Checks DP Crime Bank

(Continued from Page 1)

and Motor Vehicles.

"If your number was '123' last year, this year you could get '856,'" he explained. "It doesn't matter who had '856' last year."

When asked if anyone ever considered deleting "hot" numbers from their series or creating a truly unique numbering system, Davis said, "Why should we? What difference is it to us?

"The new tags have been a different color every year until this year," he added. "Some years they are blue, other years they're green. This year's tag is orange.

"Any police officer knows an orange tag would not have been issued in 1971," he said.

However, despite the fact that it takes two criteria – the plate number and year issued – to correctly identify a vehicle, a police inquiry into the state criminal justice information system can indicate a "hit" without that second identifier, Gil Rodriguez, second in command at the Florida Crime Information Center, admitted.

Had both the year and the tag number been required to access the file, Booth probably would be alive today because Rennie's query would have found no record in the stolen vehicles file. He could have approached the parked vehicle without fear, a police officer said.

Under the circumstances, however, he was prepared for the worst and, "in a one-on-one situation like that, a trooper is entitled to protect himself," the officer said.

At this time officials will not speculate on how much data from the stolen vehicles records actually was provided to Rennie over his two-way radio.

In such cases it is customary for the communications officer to simply say "the car is hot" or "it's a hit" without a lot of other details, the police officer added, noting the record is actually short enough to read to the querying trooper or police officer in its entirety.

Tapes of the conversation will be played at the inquest, Rodriguez said.

While there is no way to determine just how many records of vehicles stolen prior to 1975 are still in the Florida Crime Information Center's data base without dumping the records, Rodriguez said "there is a high percentage."

All vehicles that were not recovered in past years are still in there, he said.

NCIC Not Involved

Because the tag involved was a Florida tag in Florida, it was not necessary for the inquiry to go to the National Crime Information Center (NCIC) in Washington, D.C., and an NCIC official confirmed that this particular inquiry did not go there.

However, since the stolen vehicle record was still in Florida's files and since state law enforcement officials are responsible for inserting and deleting such files, that record is without doubt in the NCIC file as well, he added.

"It is surprising Booth wasn't stopped much earlier since apparently the tag had been on his car since 1974," the NCIC official observed.

Rennie has been suspended pending the outcome of an investigation and the coroner's inquest, Patrol Commander Beach said.

"We have deep sympathy for Mr. Booth's family, but we're also not going to throw the trooper to the wolves until we find out what happened," he added.

The issue before the coroner's jury will be whether the use of force by the trooper was justifiably excusable or not, an assistant state attorney said.

'Nonstop' Multiprocessor System Could Support 1,000 Terminals

(Continued from Page 1)

by a redundant Dynabus.

The Dynabus connecting the processors has a 20 Mbyte/sec transfer rate and built-in bus control for automatic switchover or disconnect in the event of a processor failure or a bus failure between two processors.

The main semiconductor memory offers a 500 nsec access time, including mapping and error detection and correction.

The optional core memory provides a cycle time of 800 nsec, including mapping and parity checking, Tandem said. Both the semiconductor and core memories are packaged on 32K boards.

One processor can support up to 32 dual-port controllers, the spokesman said. Each communications or terminal controller can handle up to 32 lines.

Each disk controller can handle up to four drives, from 10M bytes to 80M bytes in size, and each magnetic tape controller can handle two 800 bit/in. units, he added.

Tandem's Transaction Operating System (T/TOS) for the Nonstop system is a multiprogramming, multiprocessing virtual operating system.

A copy of T/TOS resides in each processor module so a processor failure won't limit system capability, Tandem said.

T/TOS allocates execution time to multiple programs on a priority basis and allocates buffer space and control blocks. It handles process synchronization; fault and trap handling; and interval clock maintenance.

Tandem said it expects to have five sales and service sites across the country when it starts delivering Nonstop systems in April. The company will maintain the systems itself, but will encourage customers to do as much maintenance and parts storage as they went.

Tandem is at 2909 Stender Way, 95051.

25 Software Packages Make Datapro Honor Roll

(Continued from Page 1)

at least 2.8 in each of the categories.

Training provided by the software vendors was another category Datapro asked the executives to rate. Although these weighted averages were not included in the Honor Roll calculation, 20 of the 25 packages would have remained on the Honor Roll even if a 2.8 or better rating in training were required, Datapro said.

Other Misses

Twelve more packages would have made the Honor Roll, the researchers noted, "if a single user had made a single rating change in a single category." The required change would have had to be in an upward direction, although Datapro didn't stress that point.

Another 17 packages met all the qualifying criteria but were rated by only three to five users each. These were given honorable mention by the survey team.

Complete results of the survey – including detailed statistics on 12 packages rated by 50 or more users and 95 others rated by at least six – are available for $10 from Datapro at 1805 Underwood Blvd., 08075.

** Alltax – Management Information Service
DOS Automatic Spooling Asynchronous Processing (DOS Asap) – Universal Software, Inc.
** DOS Dump/Restore/Plus & Virtual Disk Utility – Westinghouse Electric Corp.
** DYL-250 – Dylakor Software Systems, Inc.
** Epat – Software Design, Inc.
* Fast Dump/Restore (FDR) – Innovation Data Processing, Inc.
Foresight – Foresight Systems, Inc.
t130/Fortran – DNA Systems, Inc.
** Grasp – Software Design, Inc.
IMSL – International Mathematical & Statistical Libraries, Inc.
Komand – Pace Applied Technology, Inc.
** The Librarian – Applied Data Research, Inc.
* Optimizer/Optimizer II – Capex Corp.
Pansort – Pansophic Systems, Inc.
** Panvalet – Pansophic Systems, Inc.
Problem Program Evaluator (PPE) – Boole & Babbage, Inc.
** Quikjob 1, II & III – System Support Software, Inc.
Relo-Plus – Universal Software, Inc.
* RPG II for System 360/370 – IBM 1130/Sort – DNA Systems, Inc.
Syncsort – Whitlow Computer Systems, Inc.
* UCC One (formerly Page Management System – University Computing Co.
** UCC Two (formerly Duo) – University Computing Co.
Watfiv – University of Waterloo, Ontario
Westinghouse Teleprocessing Interface System (Westi) – Westinghouse Electric Corp.

* Second consecutive year
** Third consecutive year

Twenty-five packages (listed alphabetically) make up the 1975 Software Honor Roll, according to Datapro Research Corp.

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By Limiting Disclosure

EFTS Law Seen Hurting Credit System

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – If legislation is passed that limits the disclosure of personal information held in electronic funds transfer systems, (EFTS) the exchange of data upon which much of the consumer credit system depends could be hindered.

That warning was made by Dr. Ruth Davis, director of the National Bureau of Standards' Institute for Computer Sciences and Technology, in a report prepared for the Privacy Protection Study Commission, which is looking into information practices in the credit industry.

Credit agencies may perceive the costs of providing security as "very burdensome" and may actually prefer to spend that money defending themselves against lawsuits rather than implementing privacy safeguards, she told the commission.

According to Davis, any system of information exchange between banks, retail organizations and credit agencies would require procedures and requirements to be applied to all uniformly.

If strong technological provisions were implemented in both EFTS and credit-reporting systems, could the needed data interchange take place? Davis asked.

Tend to Circulate

Basically, credit records are classed as a subset of intelligence records. They are normally kept private but tend to circulate within the concerned intelligence community, she explained.

"Banks, oil companies, department stores and other credit-granting organizations freely exchange information with credit-reporting organizations every time a credit check is performed, as well as on a more scheduled systematic basis," she noted.

In 1974, for example, "credit bureaus conducted about 150 million credit checks on individuals, with each check adding a small increment of data to the individual subject's record," she said.

While there are about 2,000 credit bureaus, only about 200 of these are automated. Most smaller bureaus maintain their own manual record systems locally and have access to larger systems when needed. These smaller systems are also valuable sources of input to the larger systems, she explained.

Since their primary aim is to sell information, the information supplied by the credit bureaus should be, under ideal conditions, accurate and complete since customers want to maximize sales to good credit risks and minimize bad credit losses.

Incompatibility of Aims

These basic aims of credit-reporting organizations do not necessarily mesh with privacy requirements, Davis said.

Credit agencies' "desire to sell information may result in a wider dissemination of data than the individual might prefer," she pointed out.

Further, their desire to maintain complete files may also result in maintaining data, especially if detrimental, for excessive periods of time.

In addition, many keep limited records of access to data. Each time a retail sales organization inquires about an individual's credit status, that valuable item of credit information is added to the file.

Subsequent records are also kept so that, by default, an inquiry without subsequent reporting of charge authorization is an indication credit was denied to the individual in that case, she explained.

CRTs Prove 'Ouchless' Patients

KANSAS CITY, Mo. – Computer-simulated pain is being used as a stand-in for the real thing for dental students at the University of Missouri here.

A computer-assisted diagnostic course contains seven cases, each simulating a patient with a toothache. The object is to teach students how to diagnose toothache pain.

"The cases are typical ones dentists see every day," according to Dr. Jack L. Stewart, assistant dean of the university's dental school. "The course is designed to sharpen a student's ability to diagnose problems, because a simple complaint like 'toothache' may have a deep-seated cause.

"Diagnosis and prescription require thorough study of the patient's problem, and the course helps develop effective treatment plans and techniques," he explained.

The diagnostic course is one of 12 computer-assisted courses offered by the dental school. Eight IBM 3270 visual display stations in the instructional resources library are used.

Supplement Studies

The courses supplement the regular dental studies and cover subjects ranging from biochemistry to jurisprudence and ethics. To study one, students type on a keyboard attached to the terminal the course desired, and study material is displayed.

Questions and answers are displayed in response to student commands and the system explains why an answer was accurate or not and refers the student to review material if the answer was wrong.

"The amount of material to be covered in the dental curriculum is enormous," Stewart said. The computer-assisted courses "educate a student by exposing him to many cases via simulation – more than he could otherwise cover in class or the clinic."

Cbema, Patent Office Under Attack For Opposing Patenting of Software

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. – The Computer and Business Equipment Manufacturers Association (Cbema) and the U.S. Patent Office have both come under sharp attack for arguments they presented to the U.S. Supreme Court opposing patenting of software.

The California Patent Law Association (CPLA) and Software Associates, Inc. (a small software firm in Altadena, Calif.) have both filed briefs as friends of the court contending that a number of inventions "based upon programming, whether it be software programming or hardware programming" deserve patent protection.

In its comments, Software Associates, Inc. told the high court that "Cbema relies on statements of foreign origin that, in fact, do not support its position against patenting, but instead support [a] position for patentability."

Broad Terms Used

Meanwhile, the CPLA noted Congress has defined classes of inventions that may be patentable "in very broad terms and has not excluded programming of computers and programmed computers as patentable subject matter."

The Patent Office "should not be permitted to change the law indirectly" by repeated petitions to the Supreme Court "in a way [a presidential commission in 1966] . . . failed to bring about directly" a change in the law by an appeal to Congress, the brief continued.

The Patent Office triggered the current outpouring of opinions when it petitioned the Supreme Court to review a finding of the Court of Customs and Patent Appeal [CW, May 14]. The lower court had found in favor of Thomas R. Johnston's application for a patent on an accounting system implemented on a general-purpose computer.

The high court is slated to hear oral arguments on the Johnston case this week.

Software Associates, Inc. "does not consider itself prepared to form a judgment as to whether or not the invention described and claimed [in Johnston's application] is unobvious over the prior art."

Describing itself as "familiar with many of the practices of the U.S. Patent Office" and with the Benson-Tabott decision in 1972 (in which a patent on an "algorithm" was disallowed), the company said it is "confused" by Benson-Tabott and "dismayed by the prospective costs and difficulties of obtaining a patent on an invention that is implemented by software programming."

Basing much of its argument on the equivalence of software and hardware programming, the brief noted that software-based simulation can cause one general-purpose computer to function like another. In effect, the simulation program turns the original hard-wired system into a new machine, and new machines are potentially patentable, it continued.

The association approaches the case on the side of Johnston because it believes patent protection "should be granted to any invention which satisfies the statutory criteria for patentable subject matter."

The patent attorneys' group argued strongly that Johnston's invention does create a new machine that meets those criteria in a real, concrete form and not just as an idea. It is not even a new use for an old machine, CPLA said.

Check Fraud Suspects Face Trial

By Patrick Ward
Of the CW Staff

LOS ANGELES – The alleged masterminds of an attempt to forge and cash stolen Los Angles Municipal Treasury check blanks [CW, April 23] are now facing trial here.

The city still faces an "$800,000-plus" negligence suit for failing to alert banks in March of 1974 when it learned that 17 numbered blanks used for computer check printing were missing from the city's Data Services Bureau (DSB).

Police still do not know how the missing blanks got into the forger's hands, Deputy District Attorney Stephen Trott said.

However, Joyce R. Williams, who allegedly led the check-forging operation, is currently on trial, he said. Richard Keats, who is alleged to have headed the check-cashing part of the scheme, was arrested last month, he added.

Two other men with lesser roles in the plot have already been sentenced to up to 14 years in prison. Police are still seeking the man who did the actual check forging, Trott said.

T. Tamaru, DSB general manager, has said he told city officials on March 17, 1974 that the 17 check blanks were missing.

However, the officials assumed the checks were just misplaced and that it was therefore unnecessary to warn banks or police, he said.

Though detectives said at least four checks were forged, only one was cashed.

This $902,000 check was first cashed at New York City's Crocker International Bank and the funds were then transferred through several European banks, finally reaching the Hollandische Bank Uni, N.B., The Netherlands.

Approximately $800,000 was withdrawn from the account there late last year, just before police put the bank under tight surveillance.

When that check returned to Los Angeles after being cashed, the city's computers rejected payment on it, since they lacked any authorization to do so.

The Banque de Paris of Geneva was left holding the bag for $800,000, Trott said. That bank now seeks $800,000 from the city for failure to alert the banking community when it learned the check blanks were missing, Trott said.

CUMREC '76 CALL FOR PAPERS

The program committee of the college and universities machine records conference is still accepting papers to be presented at Cumrec '76. The theme of the conference is "sharing – key to the future."

Cumrec '76 will be hosted by the Southwestern Ohio Regional Computer Center and will be held in Cincinnati May 17-19 1976. Papers are due January 1, 1976. Call or send intents to:

Robert R. Caster
General Chairman – Cumrec '76
Southwestern Ohio Regional
Computer Center
University of Cincinnati
231 Bethesda Avenue
Cincinnati, Ohio 45267
Phone (513) 475-5069

Simulation Used to Put Railroads Back on Profit Track

PHILADELPHIA – Part of a plan to reorganize seven bedridden northeastern U.S. railroads into a money-making operation has entailed building the largest "model railroad" in the world.

The model doesn't run on tracks, though – it runs on a computer system.

Engineered by Day & Zimmerman, a consulting firm based here, the model is a mathematical simulation of the operations of the Consolidated Rail Corp. (Conrail), which the U.S. Railway Association (Usra) has proposed to Congress.

The Conrail Analysis Model (Cram) consists of computer programs and data representing traffic, stations, classification yards, operating costs and revenues – and more than 30,000 miles of tracks.

The reorganization plan involves the Penn Central, Erie Lackawana, Reading, Central of New Jersey, Lehigh Valley, Lehigh & Hudson River and Ann Arbor railroads.

The model is, in effect, a very large data base operated by a team of specialists who use many complex computer programs to develop information from the data and organize this data in a variety of ways.

Because more than 5 million data elements are related to freight activities alone, for example, Day & Zimmerman turned to a large computer time-sharing service for necessary large-scale DP capability for storage and manipulation of the model.

Using keyboard computer terminals in its Philadelphia headquarters, the consulting firm's analysts could develop and debug their computer programs, enter data into the system and simulate the operations of Conrail under varying conditions.

The terminals are linked to a Computer Sciences Corp. Infonet data center in Chicago by a communications network of leased telephone lines and satellite circuits.

Day & Zimmermann has been building computerized models of railroad operations for about four years now, beginning with the firm's modeling assignment from the trustees of the Penn Central.

The early model enabled the trustees to experiment with the size of the 20,000-mile Penn Central rail system and develop relationships of network size to net operating income. The outcome of these studies suggested an optimized rail configuration of about 11,000 route miles.

Since then, the consulting firm has developed more definitive models for the trustees, adding passenger traffic; detailing car types, train types and commodity groups; and introducing location-specific costs.

Last spring Usra called on Day & Zimmermann to build Cram. The initials not only describe the model, but the deadline as well, Hugh Stewart, a vice-president of the firm said. The company finished "construction" in May and has been running the model through its paces ever since.

1,715 Segments

The 30,000 miles of track in the model have been broken down into 1,715 segments. Each segment has been labeled with its own mileage, curvature, grade, signaling, speed limits, ownership and the state in which it's located. The segments come together at 1,138 points (nodes) representing switching yards, stations, ownership boundaries and state lines.

Once the skeletal structure of the proposed configuration of Conrail was developed, Day & Zimmerman analysts began preparing a traffic base of historical data provided by Usra against which forecasts could be made.

The traffic base is comprised of more than 200,000 records of "load movements," including origin, destination, commodity, number of loads, net tonnage and the resulting revenue for the railroad. The data was applied to the model converting destination and origin into model codes.

In the next step, freight routing, the firm entered into the model Usra's plan for Conrail freight routes.

The analysts were then ready to load the trains and run them over the Conrail system to determine how much freight traffic – and revenue – would pass over each segment of track in a given forecast year.

Day & Zimmermann was able to analyze the effect of freight movements on such requirements as fuel, yard crews and track maintenance, with these statistics added to the data base.

At this point, all data was brought together in the final stage, cost analysis. Cost equations were applied to the figures in three major categories: costs directly related to activity levels such as fuel consumption, track maintenance and freight-yard operations; site-specific costs such as building maintenance and depreciation; and overhead costs.

If everything goes according to plan, including passage of the necessary legislation to remove many of the regulatory restraints on railroads, Usra said Conrail will turn its first profit – about $36 million – in 1979. It predicts a 1985 profit of $597 million.

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Charts First 40 Days' Behavior

Team Develops Supernova Model Accurate Within 2%

By Catherine Arnat
Of the CW Staff

YORKTOWN HEIGHTS, N.Y. – A recently developed computer model which describes the general behavior of a star during the first 40 days after it explodes and becomes a supernova is accurate within 2% when compared with actual observations.

The model, developed by Dr. Gordon Lasher, Dr. Alan Karp and Dr. Kwing Lam Chan at IBM's Thomas J. Watson Research Center, is different from others done and possibly more successful, Lasher said, because it is simpler.

"Others have tried to model the whole phenomena," he explained.

When compared with actual observations of 38 Type I supernovae, the model showed an "encouraging fit," Lasher said. A Type I supernova is one in which the spectrum of the light emitted by the exploding star shows no evidence of hydrogen.

Lasher hopes the model will "give astronomers a handle on stellar evolution" by allowing them to work backward from the time a star explodes to find the cause of the explosion.

Although equations are available that describe what a star is like at the end of its life, "they don't tell us precisely when a given star is going to explode," Lasher said.

"What this gives us," he continued, "is a start toward quantitative understanding of supernovae. In a sense we will get an idea of where we came from since all the heavy elements, including those in our bodies, are presumed by many astronomers to originate in supernovae."

The model was developed from a set of equations based on three parameters: the amount of energy released in the form of radiant energy by the collapse of the star's core; the mass of the expanding envelope of gas; and the initial density of that envelope.

It took approximately six months to design the program, which was written in APL and run on an IBM 360/91. The result was a roughly parabolic curve that fits the first month's record of the 38 observed supernovae. After this period, there is a tail-off of light emission for which there is no account.

If the model is a true picture, Lasher speculated, the initial burst of light from the exploding star should be preceded for an hour or so by a burst of soft X-rays. Such an X ray burst has not yet been observed, but "I have hopes that X ray observations will confirm this model," Lasher said.

Chan, Lasher and Karp (left to right) study computer model of supernova.

The reaction to the model has been generally favorable, Lasher said, although "we haven't convinced my competitors" who hold different theories, he said.

CRT Interviews to Detect Suicide-Prone Found 30% More Precise Than Doctors

By a CW Staff Writer

MADISON, Wis. – A computer interview designed at the University of Wisconsin to predict suicide risk is 30% more accurate than doctors in pinpointing suicidal patients, according to the results of a retrospective study.

And, of a sampling of 21 of these patients, 52% preferred being interviewed by a computer rather than by a physician, compared with 27% of 43 non-suicidal patients.

Suicide is currently the 11th largest cause of death in the U.S. and the second leading cause of death for persons in the 15-29 age group.

"Roughly three-quarters of the people who kill themselves see a physician three months before they do it, but not always for that reason," according to Dr. John H. Greist, one of the interview's developers.

Doctors often are not sensitive to the suicidal person's "cry for help" or are reluctant to ask him about it, so the problem goes untreated.

Eliminates Prejudice

The computer interview eliminates any prejudice or hesitation that a doctor might exhibit, asks questions and processes answers systematically and will never forget to ask any pertinent questions, Greist said.

"There are definite problems in predicting suicides as people are reluctant to talk about it, especially if it stems from deviant or problem areas of behavior. People tend to give indirect, inaccurate answers or understate the problem.

"Generally, the more delicate the problem, the more the patients prefer a computer to a physician," he said.

"We realize the introduction of nonhuman devices into this sensitive clinical area will be criticized, but we would like to point out that use of machines is not necessarily inhumane," the developers of the program said.

The computer interview also avoids the problem of conservatism, in which humans underestimate the certainty of events. Studies have shown the computer interview consistently assigns a higher probability to its prediction than a doctor, Greist said.

Substitute for Psychiatrist

Patients at the University of Wisconsin are interviewed at a CRT connected by telephone and acoustic coupler to either a Univac 1108 or a Digital Equipment Corp. PDP-11. Questions are drawn from a subjective data base containing 25 factors and 246 levels of these factors.

"The computer models the very best composite psychiatrist," Greist said. The data base was developed from information provided by eight psychiatrists who were asked to list all the factors they took into consideration when evaluating patients with suicidal thoughts.

Variables Important

Many variables may be important in predicting suicide, so "the data collection techniques and the development of the diagnostic data base are far more important to the success or failure of the system than the mathematical processing techniques that are used," he said.

Both open-ended and multiple-choice questions are used in the interview and the patient has the option of skipping any question. The manner in which the computer branches from question to question depends on how the patient responds to each question in succession.

After the interview, a summary of the information gathered is provided in about two and one half minutes and the patient is predicted as being either a serious risk, nonserious risk, having thoughts of suicide or having no thoughts of suicide.

The interview in use at the university was developed in 1971 and about 200 patients have used it so far, Greist said.

French Agency Spends Millions For Little DP Use

By Andrew Lloyd
Special to Computerworld

PARIS – The use of computers by public authorities has hit the headlines in France with the disclosure recently that the national health service spent almost $50 million on computers from 1971 to 1974 but computerized only 1.5% of its accounting procedures.

The body in question – the Caisse Nationale d'Assurance Maladie – did not deny the figures, but a spokesman said DP accounted for only .2% of its total expenditures.

The information on the health service's use of DP came from a formerly confidential report requested by the French Ministry of Finance and delivered to it in March.

The information was leaked to the press by the president of a French medical association whose members are facing highly exaggerated tax demands because of a faulty computer system.

The health service is a big user of equipment from both IBM and Compagnie Internationale pour l'Informatique (CII). CII is the French national company which is merging with Honeywell Bull.

By 1974, only 16 out of a scheduled 26 computers had been installed – eight CII Iris systems, five IBM 370/135s, two Philips P1175s and one Honeywell Bull 6025.

The spokesman for the health service complained the body had been under some pressure from the industry minister to buy from suppliers it would not otherwise have chosen.

He also complained that only the bad parts of the report had been leaked. But when asked what good points had emerged from the report, he was able only to stress the report had been "constructively critical."

Despite the implication of hardware difficulties by the health service, the medical association accused the authorities of proceeding with an ill-prepared task with an incompetent staff.

The author of the audit which revealed the facts was the software house CAP-Sogeti. Its chairman, Jean Renondin, declined to comment on the disclosures on the grounds of professional secrecy.

Unique Features Shape Swedish DP State of the Art

By Julia Van Duyn
Special to Computerworld

STOCKHOLM, Sweden – To understand the data processing state of the art here, three uniquely Swedish features must be taken into consideration.

One is that each child at birth is assigned a unique "civic registration number" which consists of the YY/MM/DD plus a four-digit control field.

This number is on every Swede's birth certificate, school records, driver's license, library card and so on and, up to and including the death certificate.

A person cannot have more than one civic registration number during his lifetime.

Another feature is that every DP center here – whether commercial or government – must apply to the Data Inspection Department (established two years ago, after the privacy law went into effect) for permission if it wants to set up a file/record on an individual.

Moreover, it has to state specifically what the data will be used for. This law protects the Swedish individual's privacy, i.e., it guarantees that data such as salary, credit rating, assets, matrimonial state, etc., does not become a commercial product that can be sold to anyone who can pay the price.

This regulation also ensures that there is no duplication of the same data of the same person in several DP centers within a given type of industry or interest area.

A third uniquely Swedish feature is that every systems analyst, programmer, computer operator, remote-job entry (RJE) operator, tape librarian, etc., belongs to some labor union, as does virtually every worker in Sweden, regardless of the type of work he does.

Challenge to Ingenuity

Working within these constrictions seems to challenge the ingenuity of Swedish DP professionals. Take the case of Skandia, the largest insurance company in Scandinavia, whose DP center is here in Stockholm.

One of its major systems is designed around the civic registration number of its customers. The system, called Stofi (the system's Swedish initials translated into English mean "controlled transaction and inquiry input" system), transmits a constant stream of inquiries and input via a network of 483 Stansaab CRT terminals located in regional offices all over Sweden.

By using the unique civic registration number of each Swede as an ID number, and Stofi's simple yet powerful command language, it is easy for a clerk in any of these offices to access and retrieve the required information about a customer's insurance.

An Example

For example, if a customer wants to change his insurance because he has traded his car, the clerk retrieves the customer's record by keying in "M" (for motor vehicle type of insurance), the person's civic registration number and lastly two digits for the policy number. The clerk then inputs the new data, verifies it on the screen and transmits it to the computer center in Stockholm.

The customer now receives confirmation of his insurance policy covering his newly acquired car, generally within 48 hours, instead of a week or two later, as in the past.

Thus, by eliminating a lot of paperwork, handled by many people – which invariably increases the possibility of errors – and by inputting data directly from the source documents to the computer after it has been verified, the system cost-justified itself.

Within the next couple of years Skandia plans to expand the capabilities of Stofi in order to let the regional offices process 80% to 90% of all claims on losses which occur outside the locale of the head office.

IBM Equipment Used

The hardware in Skandia's DP center is 99.5% IBM, including: two 370/158 multiplexer mainframes (OS, MVT/VS2), one with 2M bytes and the other with 1M byter, 3420 tape drives; 3330 disk drives; 3803 tape control units; 3704 teleprocessing controllers; 3211 high-speed printers; 3270 teleprocessing printers and CRTs; and many more.

The only non-IBM hardware Skandia uses are two Memorex 3670 disk drives and the Stansaab CRT terminals.

If the 121 year-old insurance company's hardware is impressive, its software is perhaps even more so. At Skandia, as in most DP centers in Sweden, Cobol is used 75%, Assembly language approximately 22% and PL/1 and Fortran make up the balance of 3%.

Being an IBM shop, it uses Hasp as its spooler, IMS for data base, modified structured programming and time-sharing option (TSO) for on-line program development, interactive computing and problem solving. Skandia's utility programs are extensive and functional.

The Systems Service Department is divided into Administrative, Technical Support and Application Development units.

With a staff of 220 persons, they support industrial, marine and commercial systems; personal and nonlife systems; life and group life systems; customer and marketing systems; management support systems; and international systems.

The flexibility and progressiveness of Skandia's DP management can be seen in the "prodebating and problem-solving" climate it provides the staff.

For instance, Skandia recently initiated a new and exciting concept: all systems analysts and programmers act as consultants to all on-going projects. And while they interface with each other through all stages of the projects, they work independently.

Thus, each person's expertise is optimally utilized, because – as consultants – they are called in by the project leaders only when their knowledge and experience are needed at a particular stage of the project.

Moreover, if the particular type of staff needed for a certain project is busy at something else, the project leader is allowed to contract outside EDP consultants, i.e., systems analysts and/or programmers from various software service companies. At Skandia, this practice is looked upon as "quality assurance."

Van Duyn is a national lecturer for the Association for Computing Machinery (ACM) and author of Practical Systems and Procedures Manual.

ICCP, Psychological Corp. Sign Testing Pact

CHICAGO – The Institute for Certification of Computer Professionals (ICCP) has signed an agreement with The Psychological Corp. for assistance in its testing programs, particularly the Certificate in Data Processing (CDP) examination.

The Psychological Corp. will provide psychometric consultation and services and administrative support and will cooperate in the expansion of ICCP's programs to provide broader certification test coverage for personnel in the computing industry.

The CDP exam now consists of five sections and may be taken by any person with a minimum of 60 month's full-time or equivalent part-time work experience in a computer-based information system environment.

College-level academic experience may be submitted as partial fulfillment of the experience requirements, according to the institute.

Persons who do not meet the experience qualification may still sit for the exam; the CDP award will be made when evidence of completion of the experience qualification is submitted, ICCP noted.

To receive the certificate, every candidate must successfully complete all five sections of the exam.

The next exam, to be conducted under the agreement between ICCP and The Psychological Corp., will be given Feb. 21, 1976 at testing locations throughout the U.S. and Canada. Further information is available from ICCP at 304 E. 45th St., New York, N.Y. 10017.

Societies/ User Groups

Call for Papers

FOURTH ANNUAL SYMPOSIUM ON THE SIMULATION OF COMPUTER SYSTEMS, Aug. 10-12, Boulder, Colo.

Papers are being solicited on the simulation of computer systems as applied to all phases of computer utilization and procurement. Applicable subjects include systems design and modeling, program design and testing, selection, configuration and optimization. Presentations for tutorial and workshop sessions are also solicited.

Abstracts should be submitted by Dec. 15 to Dr. Gary J. Nutt, University of Colorado, Boulder, Colo. 80302.

1976 INTERNATIONAL OPTICAL COMPUTING CONFERENCE, April 27-29, Capri, Italy.

Suggested topics for the conference include optical computing systems realizations; optical pattern, character and object recognition (including robots); quasi-optical computing systems; and real-time and near-real-time light modulations.

A 250- to 300-word abstract or summary should be submitted by Dec. 15. Final papers are due by March 1. Abstracts should be sent to Sam Horvitz, Naval Underwater Systems Center, New London, Conn. 06320.

1976 NATIONAL COMPUTER CONFERENCE, June 7-10, New York.

Two-hundred authors are wanted for papers in every area of computer science, data handling, DP applications and information processing.

The total length must not exceed 5,000 words and must include an abstract of not over 200 words. Material such as equations, figures or reference listings should be counted as 300 words per manuscript page.

Six copies of the manuscript, typed and double-spaced, must be submitted by Jan. 5 to Dr. Stanley Winkler, IBM, 18100 Frederick Pike, Gaithersburg, Md. 20760.

SEVENTH ANNUAL CONFERENCE ON COMPUTERS IN THE UNDERGRADUATE CURRICULA, June 14-16, Binghamton, N.Y.

Papers are requested describing actual experience with computer use in undergraduate curriculum from a broad array of disciplines. Those received from minority institutions and small colleges will be given special consideration.

Because the conference emphasizes applications of computers in many disciplines, computer science is specifically excluded. Papers on computing services are considered only if they have novel features.

Papers should not exceed 15 pages and must be submitted by Jan. 15 to Gerald L. Engel, Virginia Institute of Marine Science, Gloucester Point, Va. 23062.

"TRENDS AND APPLICATIONS: MICRO AND MINI SYSTEMS," May 27, Gaithersburg, Md.

Submitted papers for the symposium should be of a tutorial nature, describing practical experiences with micro and mini systems or presenting new research results. Topics to be covered include: networks of processors, multiprocessor ensembles, intelligent terminals, novel architectures, programming and operating systems, security, performance evaluation and novel applications.

Three copies of a 1,000-word abstract should be submitted to Jack Benoit, Mitra Corp., Westgate Research Park, McLean, Va. 22101 by Jan. 15.

14th ANNUAL ASSOCIATION FOR EDUCATIONAL DATA SYSTEMS (AEDS) CONVENTION, May 3-7, Phoenix.

Papers are requested in all areas related to computer use in instruction, educational administration or research.

An abstract of not more than 100 words should be submitted by Jan. 15 with final copies of the completed paper due by March 1. Generally, papers should not exceed 10 pages. All correspondence should be sent to Max Ivey, 1976 AEDS convention program chairperson, University Computing Services, Engineering Building Room 101, Arizona State University, Tempe, Ariz. 85281.

McFarland Named To DPMA Position

PARK RIDGE, Ill. – The Data Processing Management Association (DPMA) has named T. David McFarland as its executive director.

McFarland joined the 23,000-member association as membership director in January 1973. Previously he had been assistant secretary for membership activities of the American Society of Agricultural Engineers.

ACM Adopts Resolution for Dissident Soviet Scientist

MINNEAPOLIS – The governing council of the Association for Computing Machinery (ACM) recently adopted a resolution expressing the hope that Dr. Valentin Turchin, a Russian computer scientist, will "be permitted to accept the invitation by Columbia University" to teach at that school.

Turchin, an ACM member, has reportedly been harassed by Soviet officials since 1973, when he became chairman of the Soviet group of Amnesty International and protested the treatment of dissidents in the Soviet Union [CW, Aug. 13].

Formerly head of a laboratory at the Institute for Automated Systems in the Building Industry, Turchin was dismissed in July 1973 and no one is permitted to hire him now.

Since April, Turchin's apartment has been searched and papers taken and he has been interrogated at length six times. He now feels there is no alternative but to leave the USSR, and was offered a post as Visiting Scholar in the Mathematics Department of Columbia. However, the Soviet government will not give him an exit visa.

ACM said it has had no word on Turchin's situation in a few months, although it has heard that the government "is closing in on him."

Societies/ User Groups

The resolution was adopted by the council during ACM's annual conference and copies have been sent to various Soviet scientific officials, as well as the chairman of the communist party, Leonid Brezhnev, and the Soviet ambassador to the U.S., Anatoly Dobrynin.

ACM has received no reaction from any of these people and the organization does not plan any further action on the matter, it said.

The full text of the resolution is as follows:

"The council is happy to note that Columbia University has invited Valentin Turchin, a computer scientist and Russian citizen now living in Russia, to accept a position as a Visiting Scholar in the Mathematics Department of the University.

"Prof. Turchin's visit would serve to advance the sciences and arts of information processing and promote the free interchange of information about the sciences and arts of information processing. Thereby, it would benefit the computing community and the public at large.

"His presence in the U.S. would make it possible for him to participate in meetings and conferences of the association, as well as other technical and scientific meetings and conferences.

"Therefore, the Council of the ACM expresses its hope that Dr. Turchin will be permitted to accept the invitation by Columbia University and voices its concern that he may be prevented from doing so."

Group Attacking Attitudes on DP

NO. HOLLYWOOD, Calif. – A judge who admitted he knows nothing about computers has helped establish the Southern California Computer Society (SCCS), an organization dedicated to changing the public attitude that the computer is a dehumanizing force.

Judge Pearce Young of the Los Angeles Superior Court started SCCS with Don Tarbell, a computer expert with the Hughes Corp., and Dr. G.A. Silver, a teacher and author of books on computer programming.

Governed by a 20-member board of directors, the society publishes a monthly newsletter and is actively engaged in developing a computer center.

Further information on the society is available from Silver at No. 405A, 12444 Victory Blvd., 91606.

Calendar

Jan. 11-14, New York – National Retail Merchants Association (NRMA) 65th Annual Convention and Business and Equipment Exposition. Contact: NRMA, 100 West 31st St., 10001.

Jan. 19-21, San Francisco – Meeting XIX of the Mark IV User Group, Inc. Contact: Mary K. Clyde, Program Chairman, IV League XIX, Chevron Research Co., Richmond, Calif. 94802.

Jan. 20-22, New York – '76 Input/Output Systems Seminar. Contact: Input/Output Systems Association, 999 Bedord St., Stamford, Conn. 06905.

Jan. 27-28, Valley Forge, Pa. – Second Workshop on Mass Storage Systems, sponsored by the IEEE Computer Society. Contact: Dr. David Freeman, Control Data Corp., 2621 Van Buren Road, Norristown, Pa. 19401.

Jan. 29-30, Paris – 3rd International Congress of Computers in Industry. Contact: Institut d'Informatique et de Gestion, 5 Rue Quention Bauchart, 75008.

Editorials

Volunteer to Help

The makeup of the National Commission on Electronic Funds Transfer has been sharply criticized by various industry observers, including our own Dr. Grosch [CW, Nov. 12] and the Association of Data Processing Service Organizations (Adapso) [CW, Nov. 19].

Certainly the commission should have been pulled together long before it was. "Inexcusable" is too kind a comment for the delay of nearly a year from the time President Gerald R. Ford signed the enabling legislation to the time he named the chairman and the industry and public members of the commission [CW, Oct. 15].

It is unfortunate, as has been noted by the critics, that there are no members on the commission itself with a great deal of technical computer-oriented background. Such an input at the commission level might well have been valuable.

However, it is likely that the commission members won't attempt to explore all the aspects of electronic funds transfer systems (EFTS) themselves. They should set up specific task groups to explore the many facets of the issue – social, financial and technical.

The commission's prime function should be to synthesize the work of these groups into a final overview report.

Certainly DP people – as well as experts from many other fields – should be called on to work in these more specialized task groups.

The commission has a national assignment and must explore many issues involving EFTS, not just the technical problems, which seems to argue in favor of having someone like Chairman William B. Widnall in charge of the group.

He is not just another "retired U.S. Congressman" for whom ex-Congressman Ford has found a job. He has a long history on the House Banking and Finance Committee and was ranking Republican member when he retired.

DP people should put aside their disappointment about their lack of representation on the commission and volunteer to help on the special task groups that will be established.

And we should all carefully watch the makeup of the subgroups in order to evaluate the job that can be expected of the commission.

'Mini' Needs Help

The idea of a specialized user organization devoted to minicomputers is a good one, and apparently many users feel the same way.

A major effort to start such a group, which has been incorporated as the Minicomputer Industry National Interchange (Mini) [CW, Sept. 17], has received over 3,000 responses from users seeking to join or requesting more information.

However, the response from the industry has been at best underwhelming. So far, no manufacturer has agreed to help partially underwrite the start-up costs for the organization even though several have expressed some interest, according to Mini President Jon R. David at 256 Garabaldi Ave., Lodi, N.J. 07644.

The deadline for getting such support is just one week away, so action must be taken soon by those firms interested in the idea.

Hopefully the idea will not die, even if a lack of vendor response causes a reworking of the idea to make it a fully member-sponsored organization without any manufacturer funding.

'Resolved Then, Gentlemen: Rather Than Use the New Funds for Privacy Safeguards, They Go for Defending Privacy-Violation Lawsuits!'

Letters to the Editor

Seeing Record Displayed Beats Keypunch Check Digit Every Time

Hooray for Edwin Levy [CW, Nov. 26]!

How anyone can believe a check digit is better than seeing the name of the record being accessed displayed is beyond me.

We don't happen to sell Singer System Tens, but, if you ask our operators or our clients' operators how they would like a nice keypunch machine with no editing or self-checking, you could get laughed out of the country.

Would you believe we have programmers who think that record length is determined by the amount of data which needs to be stored and that 80 is a number between 79 and 81?

Cliff Fryda

Watertown, S.D.

Poor 'Quality and Substance'

The reader commentary on whether software should be classified as goods or services [CW, Nov. 19] was of poor "quality and substance" and "contributed nothing to the universe."

I'm sure *Computerworld* could have found something more maturely written to print on the subject. This reader didn't appreciate Gerald H. Larsen's analogy.

Joanne C. Lang

Rochester, N.Y.

Grosch Left Out of Commission

So, the lamentable Commissar Herb Grosch was left out of the electronic funds transfer system (EFTS) commission [CW, Nov. 12]. Naturally, he assumes he should have been chairman.

Imagine the commission having to listen to his political swill? It is bad enough that *Computerworld* gives him a forum.

H.J. Schuster

Los Angeles, Calif.

Wrong Course of Action

According to Jack M. Wolfe, women don't "want" promotions [CW, Oct. 15]. The semantic differentiation of this term may be the basis for one of the arguments which are put forth regarding discrimination against women – in DP or otherwise.

Women may very well not aggressively apply for or otherwise seek out promotion because they simply don't believe they have a chance.

They have watched their more aggressive counterparts get shot down in the attempt.

If "want" means they won't fight and gruel as they would be required to – i.e., prove that they are really men in women's bodies – then I would agree that they don't "want" promotions.

If, however, "want" means be willing (and able) to accept the challenges and responsibilities of such positions, Wolfe is mistaken.

It is a mistaken management notion that one must be "aggressive," willing to step on anyone in order to be in a responsible position.

Kate Oliver

Worcester, Mass.

Mistaken Management Notion

After reading Ed Tunstall's complaints regarding his NCR 200 [CW, Oct. 15], I feel I can no longer keep silent.

As far as I am concerned, his first course of action is to work things out with the local NCR service representatives regarding his maintenance (or lack thereof).

Turnstall's second course of action is to review his problems to ascertain if it is equipment or personnel causing the head crashes.

If equipment, he should go after the manufacturer properly, not through an open forum in *Computerworld*; if people, he should train them properly in usage of the system and, most definitely, in care of the equipment.

William S. Henderson

Lake Forest, Ill.

NCR Delivers Reliable Product

Not only has NCR really entered the computer field, it delivers a product that exhibits reliability day in and day out.

As a Century computer user for four years, we at The Drake Hotel have never had printers go up in smoke as Ed Tunstall stated has happened at his site.

We find that the system as a whole has low down-time, and, when peripheral errors do occur, the operating software's error diagnostic and correction routines perform admirably.

Our present mainframe is a Century 200. Since its installation two years ago, we have never experienced a head crash and, whenever a service call is necessary, the NCR customer engineers have the system back up in short order.

The software in general is easy to use and effective. The operating system offers features not often found in machines this size.

Application software is oriented to user function, increasing NCR's response and understanding of user problems.

Both the DP department and top management agree that our Century 200 has more than paid for itself in improved cash flow and cost-effective information gathering services.

James Troester

Chicago, Ill.

A Rather Small Indian

Singer was never on my list of vanishing IBM competitors, and not just because I had very good friends working there. It simply never got into the central-architecture category. Neither was Nixdorf, now it has dumped its Telefunken burden. NCR, some of the letters in CW to the contrary notwithstanding, is moving away, and DEC – perilously, as I say repeatedly – is moving toward central status.

But Singer never really tried. But it was and is a major factor in the point-of-sale market. Even though it is not one of my "ten little, nine little, eight little Indians," the recent removal of Don Kircher interested me. The announcement of Joe Flavin as his replacement showed quite clearly how little the conventional Wall-Street-Journal decision maker understands the computer racket.

Flavin, whom I remember faintly as being in IBM World Trade during my second hitch, is and always has been a finance guy. But Singer's difficulties are not financial. Sure, like any other company, its troubles are *measured* in monetary terms. But its problems were in poor domestic sales and in performing to promises. What good can a controller type do in those areas?

I don't know what executive search outfit, if any, helped bring in a bean-counter to replace Kircher. Obviously they haven't thought through the basics of IBM dominance. Accounting practices and financial planning, superb though they are at Galactic Headquarters, are secondary or even tertiary skills. The key, as every customer knows, is salesmanship. Whatever the Gray Giant decides to push, whether in unlikely areas like dictating machines, blood dialysis equipment or PL/1, or in its mainstream markets, it pushes successfully – by selling! Once in a while there are stumbles, quickly glossed over, but in general IBM can sell anything: even VS, for heaven's sake!

Remodeling Singer management in a sales-oriented mode would not automatically insure success, or even good recovery. Look at XDS and the last years of RCA. As Bill Norris once said of something else (but closely related: complete absorption in the computer trade – that was prior to his buying Commercial Credit), it is a necessary but not a sufficient condition.

Singer can still give NCR and IBM (and Japanese and German and Italian competitors) a good run. It had early successes; the equipment lacked some human-interface consideration, and central software was *nggghh*, but the competition wasn't much better. What Singer needed, especially domestically and especially in the U.S. and worldwide depression, was creative salesmanship. It could have unloaded its unsalable computers on the humbler business ad schools, given huge discounts in Brazil, set up a customer training center in Las Vegas, advertised in *Penthouse* (sorry, Pat!). Instead – they worry about counting the money. *What money???*

I suppose Singer will dump data systems and go back to sewing machines. It would be a pity, for us in the trade, for international business for stockholders certainly, and for retail consumers, who need nicer point-of-sale gear. But there is a special infants' corner of the Indian burial ground that awaits IBM competitors who don't understand how to sell.

Herb Grosch

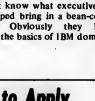
Still Time to Apply

The CDP Examination: What It Is, How to Prepare

The Certificate in Data Processing (CDP) examination is, for the first time, open to anyone whether or not they yet have satisfied that five-year experience requirement.

A change in the regulations now allows people to sit for the examination and pass the various sections necessary while they are still qualifying to actually be awarded the right to the initials.

The Taylor Report by Alan Taylor, CDP



However, I think any employer, seeing the results of an examination, will be able to give full value to such successes, so passing it is worthwhile, even without the three letters.

Perhaps this is what has doubled the number of inquiries this year. Whatever the reason, the examination, which is to be held Feb. 21 at 100 sites across the country, seems to be becoming stronger and stronger.

General Description

So, in case you are interested or know someone who is interested, here is a general description of the exam.

The exam is given on a Saturday. There are five sections: on equipment, programming, management, systems analysis and a hodgepodge of maths and accounting called "quantitative methods." You can take and pass sections separately; you don't have to pass or even take them together.

It costs $25 to become a candidate, another $10 to sit in a particular year, plus $10 for each section in which you sit. So you can get away with $45 the first year, (assuming you only sat for programming, for instance) and as little as $20 the next year, if you then want to take systems analysis only.

The questions are multiple-choice-type, such as "In Cobol, what type of condition is exhibited by the expression 'A AND B OR D OR E'" with the candidate having to choose from Or, Complex, Compound or Exclusive or This comes from the programming area.

A system question might be a simple one such as:

"What would the correct digit (X) be, using the sum-of-the-digits method, for the identification code 85463X?" Here the choices might be 2, 5, 6 and 16 with the correct answer being 6. (The Cobol expression was "compound," incidentally.)

Some, however are more judgment-oriented, as, for instance, another from the systems analysis area: "Which of the following is the least desirable purpose for conducting a poststallation systems audit?

(1) To isolate remaining problems.
(2) To finalize system's documentation.
(3) To identify the actual improvements made by the system.
(4) To determine whether the system is performing according to specifications."

Problem Questions

Now, I happen to believe that a post-installation systems audit is a very desirable part of any system documentation. And I believe it is desirable that it precede the use of an installed system. As such, I find the fourth alternative obnoxious, as it assumes that some idiot has allowed a system to go into use before it is audited.

So my choice would be that No. 4 is the least desirable aim, because that permits live use of unaudited systems.

However, the group of five CDP holders who form the certification council disagree. They say No. 2 – completing documentation – is the correct answer.

This raises the problem of how one can prepare for the examination when there are a number of questions currently included in the question pool which have problems.

The CDP exam does have a study guide which is where the sample quoted above comes from.

This lists some 10 equipment texts, eight programming texts, 27 for management, 19 for accounting and maths and 15 for systems analysis.

The guide also has about a page on each section, with descriptive paragraphs followed by a "depth-of-knowledge" statement.

A typical one is the first in the systems analysis area. This is entitled "Defining the Systems Responsibility (A) Functions (B) Concepts (C) Planning (D) Team Organization (E) Control." This has a knowledge statement that reads: "Understand the functional responsibilities and organization of the systems group" – a description which wouldn't help me at all, for instance, in defining systems responsibility for (B) Concepts or (C) planning!

Assistance Program

The Society of Certified Data Processors (SCDP) provides the only organized and centrally located candidate-assistance program in the industry. This program is a three-step process:

- Thirty-question diagnostic examinations in each section. These are used to provide explanations of the reasoning behind any wrong answers you give to the diagnostic questions.
- Individual tutoring and reading assignments.
- A dry run through a 500-question examination, leading to final study suggestions.

Program Cost

The cost of the entire SCDP program is $50, although parts of the program can be obtained at a lower cost. Tutorial help from the 500-question examination is also available at $10 per section if needed.

The SCDP estimates that, as a review activity, the process can be completed in two to three months, which means it is still practical to start preparing for the 1976 examination now and certainly for those parts for which you feel you have already covered most of the ground.

So, there is the situation. The CDP exam seems to be taking hold, it is open to anybody, and there are study guides and an assistance program. Think it over – and I seriously suggest you plan to take it soon. The sooner the better.

In a Nutshell

Fees

For examination: $45 to $85.
For assistance program: $15 to $50.

Examination Date

Feb. 21 (Special arrangements made for religous conflicts).

Examination Form

Five 50-minute sections, each section containing 60 multiple-choice questions.

Examination Qualifications

Character reference from a CDP or immediate supervisor.

CDP Award Qualifications

Passing all sections in one or more examinations, 60 months experience with a possible reduction for academic courses.

Addresses

For study guides and registration forms, write to the Institute for Certification of Computer Professionals (ICCP), 304 East 45th St., New York, N.Y. 10017 or SCDP, 500 12th St., Washington, D.C. 20024 or telephone SCDP at (202) 554-4632.

For candiate assistance program details, write or telephone SCDP.

ACM Special Issue Scope Defective Without Warnier

By Peter M. Neely
Special to Computerworld

In the Nov. 5 issue of *Computerworld*, "Structured Program Guidelines Found in ACM Effort" by Daniel Couger appeared. Couger considered the Association for Computing Machinery's special issue to be outstanding.

Unfortunately, I consider it significantly defective in scope of coverage, in particular there is no mention of Jean-Dominique Warnier nor of his programming system, Lois de Construction des Programmes (LCP).

It is my belief that academicians who profess to be computer scientists have also an obligation to be scholars. A scholar should be aware not just of the work of immediate colleagues, but also of work in related fields and in other countries.

I first noted a reference to LCP in Sept. 6, 1972 issue of CW. Since LCP, or the Warnier methodology, has enjoyed wide usage in France and other European countries and a series of textbooks is devoted to its exposition, a scholar presumably should be aware of its existence.

It is my contention LCP and top-down structured programming are essentially equivalent even though stylistic elements may tend to obscure this. But, and this is most important, the derivation of LCP is much more rigorously developed than is that of structured programming.

Suppose there are two sets of data. The first is the set of required output, the second is the set of input required in the computation of the output. The input will be ignored here.

Consider the set of all output as the whole set. Decompose this into subsets which can be considered as single entities at the next level of abstraction. Repeat as needed until the individual data elements are reached.

The three basic constructs of structured programming are then derived as follows:

- Succession – to impose order on the unordered sets (subsets).
- Selection – to select a subset or its complement (relative complement).
- Repetition – to process all elements of a set (subset).

Furthermore, correctness of

Reader Commentary

design (decomposition) in the event of complicated decomposition can be confirmed by use of the Boolean algebra induced by a set and its subsets.

If one reads Warnier's work one will find efficiency as well as correctness is addressed. Examples are given showing differences of efficiency of logically equivalent decompositions. The logical equivalence of alternative decompositions is easy to show by set membership since there is no dependence whatsoever on proving equivalence of programming linguistic constructs.

A partial bibliography is:

Warnier, J.D., and B.M. Flanagan, *Entreinement a la Programmation, Tome 1: Construction des Programmes*. Pariz: Les Editions d'Organization, 1972.

Warnier, J.D. *Entreinement a la Programmation, Tome 2: Exploitation des Donnees*. Paris: Les Editions d'Organization, 1972.

Warnier, J.D., *L'Organization des Donnees d'un Systeme*. Paris: Les Editions d'Organization, 1974.

Warnier, J.D., *La Transformation des Programmes*. Paris: Les Editions d'Organization, 1975.

And, finally, in English:

Warnier, J.D., *Logical Construction of Programs*. Leiden Holland: H.E. Stenfert Kroese, 1974.

Neely is with the University of Kansas' Computation Center.

SOFTWARE&SERVICES

RSTS/E Users Gain Fortran IV, Cobol

MAYNARD, Mass. – In a series of quiet moves starting in August, Digital Equipment Corp. has extended both the multiuser capabilities of RSTS/E on the PDP-11 and the language processors available to the users of the operating system.

The lastest extension, announced at sales meetings in October with deliveries scheduled for January, is support for Fortran IV, including a facility for CALLing macro-level assembly code to resolve logic problems that can't be handled in Fortran.

By acquiring this language processor, users should be able to immediately utilize any of the hundreds of Fortran IV routines, programs and whole libraries of routines that have been developed over many years for full-scale mainframes, DEC said, claiming its Fortran is industry-compatible.

Cobol Added

Earlier this year, in its announcement of RSTS/E Release 6A in August, DEC added Cobol, another language which should allow immediate use of many commercially available packages on the PDP-11. Unlike the Fortran IV processor, which can be used with as little as 16K memory, Cobol requires 64K storage, a DEC spokesman said.

The RSTS/E Cobol is compatible with the 1974 American National Standards Institute (Ansi) specifications and includes high-level implementations of the Nucleus and Table Handling, Sequential I/O and Relative I/O modules, the spokesman added.

Low-level implementations of the Segmentation and Library modules can be combined with capabilities that are already part of RSTS/E. And independent sort/merge and report generator utilities take the place of the ANS modules related to those functions, he said.

Compiler Under Test

The compiler itself has been submitted to the Federal Cobol Compiler Testing Service, another source at DEC indicated, but results of the submission were not immediately available.

The multiple-user capability of RSTS/E was extended in the 6A release so that for the PDP-11/70, at least, 63 users can now be accommodated concurrently. For smaller PDP-11s, the maximum was boosted to 32 users, DEC noted.

The Cobol compiler with the supporting utilities is available now for $7,000. The Fortran IV – essentially the same compiler previously available under RT-11 – will cost $1,500 when it is delivered early in 1976.

'Sara's' CRU Eases Bank's Use of SMF

By Don Leavitt
Of the CW Staff

Performance Evaluation

DENVER – Many large-scale IBM 360 and 370 installations become overwhelmed by the amount of data they get from System Management Facilities (SMF) records collected under OS.

But the Colorado National Bank here has found a package that pulls a lot of SMF numbers into a single figure for each job, and that "works pretty well," according to systems programmer Larry Klein.

The bank has only recently completed a two-year-long conversion from DOS and, until that was over, it had little need to measure and perhaps tune its operations, Klein said.

Early last April, however the bank acquired the Systems Analysis Resource Accounting (Sara) package from Boeing Computer Services (BCS).

As its name implies, Sara is basically an accounting system "but it has some items that can be used for performance monitoring, in a small way," the programmer explained.

The thing that sets Sara apart from most other packages – for accounting or monitoring – is its generation of a single, repeatable number called a Computer Resource Unit (CRU) as the end result of an equation that attempts, at least, to take into account all the resources used by each job.

Factors included in the equation are CPU time, channel time, transfer rates for different devices and core size. Weights applied to these factors, and indeed the factors themselves, can be redefined by the user until they reflect – in the installation's view – the true relative cost of each job.

Once the CRU has been defined, the bank is then able to define its workload and how the patterns of job mix, deadlines and resource usage work in its shop. Each job is run and its CRU is noted.

"Then you decide where you want to make adjustments and see what the changes do to this relative picture of the job's use of the effective power of the system," Klein said, "Does [the change] improve the CRU? Where do you go from here? That's what we've been doing with it."

Cautious About Modifications

Although the bank has the ability to modify the equation that generates what it considers to be its CRU, Klein said he had pretty much gone with the default values provided by BCS. He is cautious about making any radical changes in that basic calculation, he said, since all of the "readings" per job are relative to the equation; if the base is changed, all the figures accumulated to data are irrelevant.

The bank has a IM 370/145 and a IM 155 which share 18 IBM 3330 disk drives and 10 Storage Technology Corp. 3480 tape units. The 145 is used for on-line work, runs under OS/VS1 and is not being monitored by Sara.

SMF data is keyed to the start and stop times of individual jobs, Klein noted, and with on-line operations, one job is in operation all day long.

The 155, on the other hand, handles batch work for checking accounts, loan accounting and savings for more than 10 banks in addition to Colorado National.

It is hard to put a finger on any direct improvement triggered by Sara, Klein admitted, but it has helped in several little ways.

The nature of bank work prevents anything less than 24-hour operations, he explained, but he "did look at certain jobs as far as core usage was concerned and did cut them down to point where we alleviated some problems at certain points of the day."

A reordering of SVC lists was triggered by the bank's use of the Slacmon or Supermon software monitor from Cosmic, but Klein noted it was in the daily reports out of Sara that the value of the reordering was confirmed.

The bank considered several alternatives before choosing Sara, but rejected some of the more comprehensive software monitoring packages because of their cost. They were just too expensive for its situation, Klein said, noting the bank does not yet feel it can afford people full-time on system performance.

In addition to Slacmon or Supermon, the bank uses a package from Value Computing to manage chargebacks to using departments, and IBM's General Trace Facility is brought out "every once in a while" to check out a particular programming problem.

Univac Courts Honeywell Users With Conversion Aid for 90/30

BLUE BELL, Pa. – Source programs and data files previously used on Honeywell 200 and 2000 series CPUs can be moved to the low end of Univac's Series 90 – the 90/30 – with a conversion package now available from Univac.

The conversion work can be carried out on a user's own 90/30, if it has already been delivered, or at a Univac customer service center, the vendor noted.

The center's facilities may also be used by 90/30 users whose systems do not include magnetic tape, which the conversion package requires, a spokesman added.

Three specific conversion aids are included in the package. CTC 3 is a translator to convert Honeywell 200/2000 series Cobol source programs to Univac 90/30 Cobol.

ETC 3 goes even further, aiding those Honeywell users who have not developed their source programs in Cobol. This translator package converts Honeywell's 200/2000 series Easycoder source programs to Univac 90/30 Cobol, the Univac spokesman noted.

Finally, the conversion package includes Ficon, which Univac described as a data base conversion program to create magnetic tape or disk files in Univac format from existing Honeywell-formatted files.

The 90/30 system's Report Program Generator is an industry-standard implementation which can accept existing programs with minor modifications, the Univac source added.

In operation, the conversion process takes three steps, he said: making an inventory of all programs and data files; translating them; and testing them to ensure proper operation in the new environment.

Once conversion has been completed, user programs and application systems will operate under control of OS/3, the standard Univac-supplied operating system for the 90/30. They become a part of the user's library, indistinguishable from any programs the user writes directly in the "native" 90/30 languages, Univac said.

Standards Group Impasse at End

WASHINGTON, D.C. – The Standards Planning Requirement Committee (Sparc) has apparently resolved the impasse which was facing its data base management system task group [CW, Nov. 19].

The problem of the data manipulation language specifications has been taken off the task group's agenda and given, instead, to American National Standards Institute committee on Cobol, X3J4, since the interface environment currently being considered is from that high-level language, according to Sparc Chairman William Madison of Harvard Business School.

Relieved of that problem area, the task group has been asked to return to its basic work of determing the feasibility of a standardization effort for data base management systems.

'Infosys' Application Packages Tailored for S/32 Installations

ANN ARBOR, Mich. – Manufacturers and distributors can pick and choose individual application systems from Apodictics, Inc. to put together as extended an operation as they want on an IBM System/32 CPU.

The so-called Infosys packages are said to handle all business functions including order entry and invoicing, sales analysis, cost control and accounting.

Inventory control, payroll and purchase order control are also supported by the Apodictics software, a spokesman said.

Work-in-process, bill-of-materials and material requirements control are still other areas covered by the Infosys packages, he added.

The applications are designed to use the CRT screen on the System/32 as a prompting device. Coupled with editing functions applied as soon as data is entered, this assures that only correct data is entered, he claimed.

Each application system provides a paper audit trail which can be used to reconcile its operations at the end of any accounting period, he added.

Each subsystem is designed to accommodate a wide range of business requirements, according to the vendor. These include pricing based on total quantity of order, automatic back orders, open item receivables, multiple corporations, user-defined charts of accounts and automatic commission calculations, the spokesman explained.

The packages are available for one-time fees covering five years or for monthly rental fees plus installation charges. The one-time fees range from $1,500 for order entry to $650 for accounts payable; monthly rates are from $48 to $20 after installation charges of $500 to $250.

Prices include some customizing. The vendor also provides file conversion support for $100 per application system.

Apodictics can be reached through P.O. Box 2109, 48109.

Interactive Goes Overseas

WALTHAM, Mass. – Interactive Data Corp. now has a branch office in London providing on-line access to the company's financial and investment-oriented data bases, a spokesman said from 486 Totten Pond Road, 02154.

N.Y. OS Users to Look at CPE

NEW YORK – The next two meetings of the OS Eastern Region Systems Group (Oserg), one scheduled for next week and the second in mid-January, will be devoted to computer performance evaluation (CPE) topics.

The sessions are open to interested users not already members, according to the group's secretary.

On Dec. 19, the group will hear users tell of their experiences with hardware and software monitors on IBM systems at several large New York installations, she said. On Jan. 23, a technical presentation on performance monitoring will be made by a vendor spokesman.

Oserg is made up of systems programming management and technical representatives from more than 100 installations utilizing IBM's OS and OS/VS in the New York metropolitan area.

Described as a supplement to Share and Guide on the local level, Oserg meets monthly in Manhattan to provide a forum to air – and hopefully resolve – software-related problems, to hear special presentations by members and vendors and to coordinate activities with other user groups.

Specific information about the CPE-oriented meetings or about membership requirements is available from Marvin L. Silverman, Oserg president, 75-23 113th St., Forest Hills, N.Y. 11375.

IPL Links Transactions to Data Bases

ANN ARBOR, Mich. – The Cybernetics Division of Automatic Data Processing, Inc. has added the Information Processing Language (IPL) to its network's capabilities.

Described as a high-level language emphasizing "ease of use and flexibility" in data base management and transaction-processing applications, IPL was designed for the cost-effective development of systems to collect, organize, validate, update, report and control management information, Cybernetics said.

Through a combination of features, IPL is said to provide the benefits of flexibility in the design of systems while retaining efficient processing.

IPL offers a variety of techniques for the storage, retrieval and analysis of large quantities of information. Data can be structured to meet special requirements and to permit multiple applications of a data base with one-time input.

IPL's validation techniques filter data at the source to ensure accuracy. Data bases can be updated at will with low cost, while IPL's built-in security controls limit access to sensitive information, a spokesman said.

Should requirements change or new information be required, the entire data base may be reorganized through a single "transform command," he added.

A reporting system facilitates the creation of both production and ad hoc reports in any format desired. Unlike most data base management and transaction-processing systems, IPL systems may be integrated into existing applications that use standard languages or other Cybernetics information management products, network sources noted.

IPL may be used with any standard remote computing terminal and is "ideal" for applications requiring data entry and reporting from multiple locations, Cybernetics claimed.

The ease with which modifications may be made to both data bases and reports makes IPL "particularly attractive in fast-changing environments" where conventional data base systems and standard languages such as Fortran, Cobol or Basic are impractical, the spokesman continued.

Cybernetics is headquartered at 175 Jackson Plaza, 48106.

Asgol Puts 'PL/I' Code on Nova

ORANGE, Calif. – With high-level constructs described as similar to Algol or PL/I, Asgol from MDB Systems, Inc. is said to be a structured programming language operating under RDOS or XDOS on Data General Nova or "Nova-transparent" minicomputer systems.

Providing "intellectual manageability," the language processor features a "flexible and generalized expression organization," a stylized listing to replace the flow chart embedded Assembly language, modular growth and code efficiency, the vendor explained.

The compiler indents at each BEGIN and END level and provides visual linkage and numbering of corresponding BEGIN-END pairs. This visibility does not eliminate the need for competent systems programmers, MDB admitted, "but it does make such individuals 50% more productive."

Recursive and reentrant object code is generated by the compiler. Reentrant code has many advantages, according to MDB, including fast context switching in systems.

Recursive techniques are important, the vendor continued, in the development of compilers and interpretive language processors.

The compiler operates in a single pass, is written in Asgol and is composed of many "external procedures" which are called into core as needed. It will run in as little as 8K of memory, but runs faster with more, the vendor said.

A programmer's manual, which could serve as an introduction to the language, is available for $10. The Asgol software itself costs $1,250.

MDB Systems is at 981 N. Main St., 92667.

IFM Called File Manager, DBMS

KANSAS CITY, Mo. – Now available on the United Computing Systems (UCS) network, the Interactive File Manager (IFM) functions as both a file manager and a data base management system (DBMS).

While IFM can perform routine file maintenance requirements, it is also capable of handling applications such as inventory control, personnel management and sales and accounting information systems, according to UCS.

IFM has a vocabulary of 13 action verbs (HELP, SORT, UPDATE, SCAN and PRINT, for example). Keyword phrases direct these verbs to the specific data upon which action is to be taken.

The Macro verb, which allows definition of new IFM verbs, extends the potential of the program for the experienced user. A prompting capability within IFM helps direct the novice user.

Report creation is facilitated through the PRINT verb for simple ad hoc work and the REPORT verb for standard, repetitious output.

IFM's file maintenance and management capabilities are available in the interactive mode. They eliminate the need for complex batch systems such as Sort/Merge and specially developed Fortran or Cobol programs, UCS claimed.

The combination of the file management and data base management capabilities permits development of information systems around a multiple file environment.

The output file containing sales forecasts from a forecasting program, for example, can form part of a sales management system, eliminating the need for reformatting or loading into a separate data base, UCS said.

IFM is accessible in time-sharing and remote job entry modes from the over 90 cities across the nation currently serviced by UCS's Uninet communications system. IFM is also available nationally via Wats communications facilities in the remote batch mode.

UCS is based at 2525 Washington, 64108.

DP Dialogue

Notes and observations from IBM which may prove of interest to data processing professionals.

An ETMF freight depot near Chicago at dusk.
IBM 3767 terminals are linked by a communications network spread through 19 states.

Freight Carrier Picks Up Speed with New Communications Terminal

It isn't every day a company installs new terminals throughout its operation, enlarges the scope of its communications system and projects a savings of some $60,000 a year.

That's what's happening at ETMF Freight System of Dallas, where new IBM 3767 Communication Terminals have replaced the company's 2740s in 55 freight terminals around the country.

"Not only do the new hardcopy 3767s cost 24% less than the 2740s," says Tom Hendrickson, director of management systems, "but they can also print up to five times faster."

The 3767s are the latest addition to ETMF's online network, which uses the IBM Freight and Equipment Reporting System for Transportation (FERST/VS) for message switching and equipment control. At ETMF, the FERST/VS group of Program Products runs on a System/370 Model 145 linked to a communications network that connects the carrier's freight terminals.

This fall, the company expects to install the third program of the FERST/VS package—billing. "Putting the billing function online would have meant adding terminals to handle the extra workload," says Hendrickson. "But the greater speed of the 3767s means we will need fewer additional terminals to do the job.

We figure the saving on machine replacement, plus the saving on additional machines, will add up to some $60,000 a year."

The 3767 prints faster because it is a bidirectional matrix printer. Its built-in logic microcode determines whether it would be faster to print from left to right or right to left. It can also decide how best to move on to the next print position, say an indentation or a tabbed column, without any wasted motion. The result: the 3767 can print up to 80 characters per second.

"An inventory report can now be printed in ten minutes," Hendrickson says. "With the 2740, this job would have taken almost half an hour."

He points out that the faster printing speed means the machine is more available to receive reports and enter data. And getting more information more quickly means that ETMF is in a better position to assure on-time pickup and delivery. "Timely service is the most important product a freight line has to sell, especially since all rates are regulated by the Interstate Commerce Commission."

Were the 3767s easy to install? According to Hendrickson, it was a "plug-in" situation for the most part. "We needed little help from IBM, and we were able to schedule installation when it was convenient for ETMF." He goes so far as to say he can install a 3767 himself in 15 minutes flat. "Operators adapted quickly to the new terminals, and no training people had to be sent out to the field."

The new machines have proved highly reliable. Based on Large Scale Integration (LSI) technology, they have few mechanical parts to go wrong. Should any trouble occur, a built-in diagnostic capability alerts the operator and the problem can be isolated. Often this can be remedied on the spot . . . an important consideration in a small, remote freight terminal.

The new terminals have improved the productivity of the communications system at ETMF. They have also opened the way to growth, because they are compatible with Systems Network Architecture (SNA). "This combination of equipment and programs will simplify the connections among controllers, lines and terminals in our system," says Hendrickson. In 1976, plans call for the installation of three components of SNA: Synchronous Data Link Control (SDLC), Virtual Telecommunications Access Method (VTAM) and Network Control Program (NCP).

"With these enhancements," continues Hendrickson, "we will be able to increase transmission speed while continuing to give our users at remote terminals direct access to application programs in our central computer. In addition, we will be able to use many different kinds of terminals with varying functions within the network."

Computer Helps Farmers Fight the Blight

Figuring out the best time to spray potato crops to prevent blight used to be largely a matter of guesswork. But for the past four years, more than 100 farmers from Maine to Florida have been getting valuable assistance in their battle against a lethal, blight-producing fungus from an unexpected source—a computer program known as "Blitecast".

Developed and administered by plant pathologists at Pennsylvania State University at University Park, Pa., the Blitecast program predicts the appearance of the fungus seven to fourteen days in advance. Data for the program is collected with hygrothermographs and rain gauges, which monitor temperature, humidity and rainfall in each field on a daily basis. At the end of the week, growers telephone the data to researcher John Peplinski, who uses a typewriter terminal in his office to enter the information into the university's System/370 Model 168. The data is analyzed against the conditions that are known to promote fungus growth—warm days, cool nights and extended periods of humidity exceeding 90%.

Within a few seconds, the computer prints out a recommendation indicating whether it will be necessary for the farmer to spray fungicide that week. "It used to be standard procedure to spray automatically once a week," says Peplinski. "By using our program, many growers have cut their spraying schedules substantially, without sacrificing crop safety. At $4 per acre for fungicide, farmers can save considerable money—and cut pollution at the same time—if conditions don't indicate fungus growth."

The computer can also produce a longer report that summarizes blight forecasts, weather conditions and spray recommendations made to date for each participant. A typical file extends for the duration of the potato growing season – generally from May through August.

In research related to the Blitecast program, scientists at Penn State are also studying the extent to which reduced concentrations of fungicide will effectively kill blight, and the precise relationship between weather conditions and tuber maturity. "Our goal is to increase crop yield by every possible means," says Peplinski. "Using the computer is the only way we can get accurate predictions to our farmers quickly enough to be effective."

At the Penn State University test plot in Rock Springs, Pa , plant pathologists study conditions that cause potato blight.

"One of the sweetest systems in the industry"

That's the way Mario Calderin sums up his experience with the new IBM 3790 Communication System. Calderin is director of management information systems at Work Wear Corporation's Rental Services Division. The Encino, California, company installed one of the first 3790 networks in the country. Running under IBM's Systems Network Architecture (SNA), the 3790 brings new data processing capabilities to the company's remote locations. At the same time, it streamlines the flow of information between the field and the System/370 Model 145 at the firm's central computer facility.

Mario Calderin

Calderin was so enthusiastic over his early success with the 3790 that we asked him to tell the story in his own words.

What has the 3790 accomplished for your company?

"There are two major benefits that the 3790 is bringing to Work Wear . . . centralized financial control . . . and decentralized operational control.

"With the 3790 system, we're giving data—and the responsibility for handling it—to our sales regions. And corporate is getting a complete picture of the financial state of the company in real time . . . which means in time to act on it."

Why do you say those are major benefits?

"Because of the nature of our business. We rent and launder work clothes and industrial and linen supply items at 33 remote locations across the country. That's problem number one—geographical dispersion. And every day we've got to account for four or five million pieces of laundry that are somewhere in the process of being picked up, cleaned or delivered to our customers. That's problem number two—a fantastic amount of detail work to keep track of daily."

How did you handle all that before?

"Badly. Three years ago, I would have said that our major product was paperwork. Paper reflecting over a million transactions a month flowed from the plants to four regional data centers, where it was keypunched and entered in local computers. These in turn transmitted the data to the central computer at our Los Angeles headquarters.

"By the time everything was logged in and errors reconciled, the information was out of date. It was history. Moreover, it was indigestible. Different standards used in different regions resulted in data incompatibility."

What changes have you made?

"When the 3790 system is completely installed—most of it is already in place—data from all 33 locations will be transmitted at the close of each business day to our Model 145 in Los Angeles. By the start of the next morning, management can know exactly where we stand, company-wide, on order volume, bank deposits, accounts receivable, inventory status, and other vital information. That's what makes centralized financial control possible."

How is the data entered in field locations?

"Each plant has two or three 3277 Display Stations linked to its own 3791 controller—a programmed unit that cuts down the burden on our central computer. As each item is entered at the terminal, it's checked for validity, with corrections being made on the spot. It then goes to the controller, where the plant data files are updated. At night, the controller transmits the day's data to the 145, which updates the company-wide master files.

"The 145 then prints out documents like the day's invoices and drivers' pickup slips—between 40,000 and 50,000 of each daily, or some two million a month—for distribution by courier back to the plants. But starting in the summer, all this plant work will be offloaded through the 3790—a tremendous step forward."

What do you mean by "offloaded"?

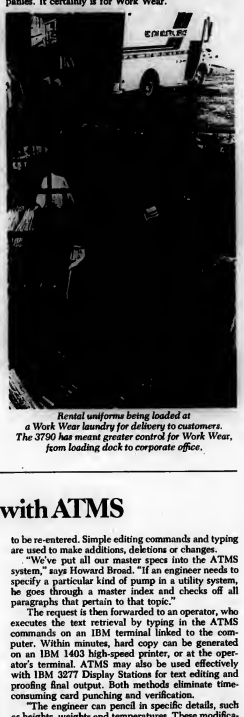
"There'll be a line printer at each plant. The 3790 will process and print data on this printer for onsite production of all the plant's daily documents. This means they'll produce their own invoices, pickup slips and load reports almost immediately. No more waiting for courier deliveries. That's what I mean by decentralized operational control."

Is data also available interactively?

"Yes, both at plants and at headquarters. Information is always current and accessible for quick response to any inquiries, including trend analysis and other management information programs.

"Incidentally, if we should acquire new plants, they can be added to the 3790 network by simply installing hardware. All our programs are written, assembled, tested and stored on our Model 145, ready for use when our plants need them.

"We think that extending computer power to the field via the 3790 is the way to go for many companies. It certainly is for Work Wear."



Rental uniforms being loaded at a Work Wear laundry for delivery to customers. The 3790 has meant greater control for Work Wear, from loading dock to corporate office.

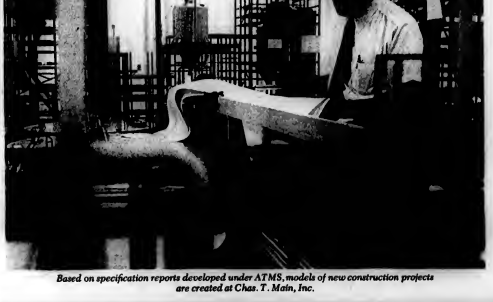
Producing Customized Specifications with ATMS

Last year, the Boston-based engineering firm of Chas. T. Main, Inc., produced over 20,000 pages of design specifications for construction projects in the electric power, pulp and paper, printing and publishing, and general manufacturing industries.

"Whether the assignment involves the design of a new factory, plant additions, or an environmental system," says Howard Broad, manager of data processing, "our business demands that we organize and edit pertinent information efficiently and accurately."

To meet what amounts to constant deadlines, engineers at Chas. T. Main use a comprehensive series of "master specifications", or standardized designs, and an IBM Program Product, the Advanced Text Management System. ATMS, a powerful editing and command language, allows the firm to retrieve master spec data stored on a System/370 Model 145 and to modify it to fit each new project.

The ATMS concept is simple. Any text material, once entered into the computer system, never needs to be re-entered. Simple editing commands and typing are used to make additions, deletions or changes.



Based on specification reports developed under ATMS, models of new construction projects are created at Chas. T. Main, Inc.

"We've put all our master specs into the ATMS system," says Howard Broad. "If an engineer needs to specify a particular kind of pump in a utility system, he goes through a master index and checks off all paragraphs that pertain to that topic."

The request is then forwarded to an operator, who executes the text retrieval by typing in the ATMS commands on an IBM terminal linked to the computer. Within minutes, hard copy can be generated on an IBM 1403 high-speed printer, or at the operator's terminal. ATMS may also be used effectively with IBM 3270 Display Stations for text editing and proofing final output. Both methods eliminate time-consuming card punching and verification.

"The engineer can pencil in specific details, such as heights, weights and temperatures. These modifications can be entered at the terminal," says Howard Broad. "At the same time, irrelevant portions of the master spec can be deleted and additional paragraphs added. All new information is automatically stored on computer disks.

"Because large portions of the master specs don't need to be retyped or reproofread, ATMS has significantly improved our turnaround time. We've eliminated clerical overtime and substantially reduced our per-page production costs since we started using ATMS.

"Equally important, ATMS is helping us to assemble better master specs. With it, we are able to update continually such information as environmental standards, improved materials and new test procedures," he continues. "The more standardized and disciplined our specifications, the better we can serve our clients."

DP Dialogue appears regularly in these pages. As its name suggests, we hope DP Dialogue will be a two-way medium for DP professionals. We'd like to hear from you. Just write: Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM.
Data Processing Division

CPE Goals Differ From Shop to Shop; Lack of Standard Measure Also Hurts

By John J. Hunter
Special to Computerworld

When a doctor takes your blood pressure, he usually tells you if it is high or low. If it is beyond an accepted, predefined limit, he advises corrective action.

Unfortunately, the state of the art in Computer Performance Evaluation (CPE) is very far from this stage. Perhaps it must always remain so, for reasons we will discuss later.

Performance Evaluation

At this point, the comments of Dr. J.C. Browne, editor of a leading CPU practitioner's journal, *Performance Evaluation Review* (PER), published by the Association for Computer Machinery's Special Interest Group on Measurement and Evaluation, are relevant:

"A principal problem in performance measurement and analysis is a lack of well-defined reasonable ranges for performance metrics, such as CPU, device utilization, throughput, response time, and others . . . PER solicits for publication case studies of performance measurement and analysis projects where reliable values of device utilization and other metrics were obtained in the context of a reasonably well-defined environment.

"Such data will be useful in establishing a basis for comparison which can be of great value to analysts with limited experience and to managers and administrators of data processing installations."

Why is there such a problem in establishing "good" values in absolute terms for CPD measurements? The answers lie in two basic observations: (1) There is no single measure of computer performance; and (2) every CPE shop is different. Let's expand on both of these ideas.

Every Shop Different

One of the first frustrations to hit the beginning CPE user is to successfully use his new tool, say, a hardware monitor, and discover his CPU busy rate is 53.8%.

When he tells his boss of his finding, the boss says "Is that good?" The analyst will usually have to say "It all depends."

Depends on what? A list of factors on which it depends would include throughput, user turnaround satisfaction, planned expansion and the feasibility of system replacement.

For a center that is doing all its work in eight hours, has no customer compliants, has no planned expansion and has a fully depreciated system, 53.8% is fine.

However, given these circumstances, 23.8% or 73.8% would also be fine.

For a center planning to double its workload, 73.8% CPU utilization is not fine. For yet another center, which feels it can do with a smaller system, 23.8% CPU utilization is low enough to indicate the matter should be seriously considered.

These examples illustrate the point that perhaps CPE measurements made in a vacuum will never be correct. They will probably always need to be viewed in terms of the center as a whole.

No Single Measure

The fact that there is no absolute value that expresses "goodness" for any single CPE measurement has prompted a trend in CPE to combine all measurements to get an overview of the system. The result is a single metric composed of the individual measurements.

One such approach is the Kiviat graph, which was presented to the general public in October 1973. Kiviat graphs are plots of common performance measurements that are usually portrayed by Gantt charts.

The graphs themselves are circular, with all axes originating at the center and terminating at the circumference. Although any value can arbitrarily be assigned to the axis, a common version of the graph has eight axes, with the vertical and horizontal axes used for parameters that are usually considered favorable. Examples are component utilization (CPU, channel) and overlap of component utilization. The diagonal axes are used for things that are considered unfavorable.

Following these conventions, measurements will produce shapes which are readily recognizable, both good and bad. The best theoretical shape is a four-pointed star, while nonoptimal conditions are indicated by deviations from this shape.

Although the Kiviat graph is not the perfect answer to the delemma of no single measurement, it has several very important benefits to new CPE users. First, its very existence indicates the need to look at a mix of variables simultaneously and not a single measure.

Second, it provides the benefit of more graphically presenting changes in system behavior over time, if the charts are updated on a regular basis.

While updated bar charts or tables would provide the same information, the degree of change in individual variables and changes in their interrelationships are much easier to see in the form of the changing shapes provided by the Kiviat graph.

The third advantage of the Kiviat graph comes from using the eight axes in a standard manner. This scheme involves the use of each of the eight axes for a specific function.

For example, the first vertical axis is used to represent CPU utilization, while the first horizontal axis is used to represent CPU and channel overlap. When this scheme is followed, the resulting shapes can be compared with a series of standard shapes, each associated with some system condition.

A system that is I/O-bound, for instance, will have a shape called an "I/O wedge," while one that is CPU-bound will be a "CPU sailboat." A well-balanced system will have the previously mentioned four-pointed star shape.

Although the Kiviat graph has some technical limitations that prevent it from being a CPE standard, it is a step forward in an area in need of progress. The popularity of the graph is attested to by the fact that one hardware and one software monitor vendor recently added it as an option in data reduction software.

One of the factors working against the use of standard numbers, or even standard shapes, as an absolute measure of goodness is the variability in DP center workloads.

Above all, common sense and judgement must prevail, as they should in all aspects of CPE.

This article was extracted from a 20-page "Product Class Report" on CPE soon to be released by Auerbach Publishers, Inc. of Philadelphia, where Hunter serves as software editor.

Linkpack Usage Eyed by 'CUE'

SUNNYVALE, Calif. — An option now available with the Configuration Utilization Evaluator (CUE) from Boole & Babbage measures the activity of modules in the Linkpack Area.

Measures such as CPU Busy, Page Residency Time, Page on APQ, Page Being Input, Page Fixed and the percent of the total Linkpack page faults which are attributable to each module are given.

With this information, the user can pack those modules with high activity into the smallest number of pages, thereby reducing paging and reducing the Linkpack Area working set, the vendor said.

CUE is a software measurement tool which determines the activity of resources in the system as well as queueing of tasks waiting for these resources.

The Linkpage Area Usage option is available for IBM's VS1 or VS2. The option is available for $1,750 from Boole & Babbage at 850 Stewart Drive, 94086.

DOS Partitions Balanced

NEW YORK – A partition-balancing system that controls priorities dynamically under IBM DOS or DOS/VS, EQULPRTY from Labyrinth Systems Ltd., may be able to increase a user's throughput 30%.

The console operator is free to designate which partitions are under the balancer's control at any time.

EQULPRTY works by continuously checking each partition for which it is responsible. When an executing program is in an I/O-bound phase, its partition is immediately assigned a higher priority. When it is in a CPU-bound phase, the priority is lowered by the system.

Improvements of as much as 30% can mean cost savings in overtime pay or additional shifts, the vendor continued. Cost of the improved performance, according to Labyrinthe, is "about five minutes in a 24-hour day," and $1,995.

The vendor is at 2 Penn Plaza, 10001.

For Training and Tuning

Service Backs CPE Novices, Experts

RESTON, Va. – DP managers looking for help in establishing or supporting computer performance evaluation (CPE) efforts within their own installations or interested in having a CPE team come in from outside may be able to use the consulting services of CACI, Inc.

Four individual categories of analysis have been identified as targets for the new operation: DP center management, systems planning, applications development and fiscal management.

The focus can be on the user's rapidly expanding work schedules, rising costs or the need for extensive budget and planning activities, CACI noted.

The consultants expect to provide whatever level of support seems worthwhile, from one-time visits to solve specific problems to regularly scheduled visits on an annual retainer basis. CACI will use whatever CPE or CPE-related tools the user already has or it will bring in the tools it needs to use.

In addition to reviewing a user's performance, CACI will make recommendations and cost estimates of the proposed changes and will, if the user wishes, support the implementation of the modifications.

Organization and training of user staff to run its own in-house CPE activity – or evaluation of how well an existing CPE group is doing – is still another service CACI can now provide, a spokesman said.

The CACI staff has had "considerable experience" in monitoring Control Data Corp., IBM and Univac systems, he added, but the concepts behind CPE can generally be applied to any installation willing to devote time, staff and funding to the project.

The need for and value of CPE increases with the complexity of the computer system and rising DP costs, the consultant noted.

The CPE services are being managed by CACI Inc.-Federal, 1920 Association Drive, 22091.

Cosmic 'Vicar' Manages Images

ATHENS, Ga. – The Video Image Communication and Retrieval (Vicar) system from the Cosmic clearinghouse is an expandable library of application programs and a supervisory control program designed to ease the acquisition, digital processing and recording of image data.

Intended primarily for IBM OS/360-370 users, the application programs perform image-processing functions such as picture comparison, expansion, two-dimensional convolution filtering, geometric transformation and other image-enhancement operations, a Cosmic source said.

The user accesses these services through command instructions supported by the control program. The specifics of the operation required at a given time are defined by the operands with which the user completes the commands, the spokesman added.

Vicar is said to require minimal programming knowledge and little data input from the user. The system also uses self-contained specialized I/O routines intended to reduce library and main memory requirements.

Currently the application library contains more than 200 processing programs, Cosmic said, adding all use standard Vicar support facilities. Vicar itself is available for use under OS/360-370 or, in a special packaging, under 44/PS on the IBM 360/44.

Described as 60% Fortran and 40% IBM Assembler, Vicar is made up of "approximately 82,000 source statements." The OS version cataloged by Cosmic as GSC-12706/CW and the 44/PS version (NPO-13415/CW) are each available to U.S. users for $1,670, with documentation separately priced at $88.

Cosmic is at Suite 112, Barrow Hall, University of Georgia, here in Athens, 30602.

Bring Better Control

POS Systems Improve Food Operations

CHICAGO – Faster operations, greater accuracy and better management control are benefits resulting from the operation of computer-based, point-of-sale (POS) accounting systems by Interstate Tower Restaurants.

A division of Interstate United Corp., Interstate Tower Restaurants runs five restaurants in the new Sears Tower here. POS accounting systems are operated in three of the five – a coffee shop, a dining room and a pub with food service.

"The POS accounting systems make it possible to speedily and accurately price all items," according to Don Stanczak, general manager. "Sales tax is also automatically calculated, eliminating the possibility of tax errors or omissions.

"The systems record every item sold and every check used," he pointed out. "As a result, we have complete cash and check control.

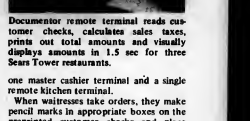
"Overall, we're able to obtain more information faster," Stanczak said. "For example, we can get a report on the number of each type of item sold at any time of the day, providing us with an instant analysis of product mix. As a result, we're able to maintain better management control."

Produced by the Data Systems Division of Addressograph Multigraph Corp., the Documentor POS systems include a processor with a minimum of 4,000 bytes of memory, a master terminal and multiple remote terminals. Both the master and remote terminals have a multicolumn printer, visual numeric display and up to two cash drawers.

The terminals are also equipped with document readers capable of scanning pencil markings on customer checks preprinted with up to 120 menu items. The customer checks are printed on Wausau Mills Company's oil- and grease-resistant paper, which is treated with "Scotchban" brand paper protector to eliminate oil and grease stains which otherwise might be incorrectly interpreted as pencil marks.

Interstate operates the POS systems in different configurations in each of the three restaurant locations. The Dutch Corner coffee shop uses two terminals, one master and one remote unit, in its cashier operations and one remote terminal in its kitchen.

The Franklin Inn dining room operates a master cashier terminal and two remote kitchen terminals. The Dinghy Pub has one master cashier terminal and a single remote kitchen terminal.



Documentor remote terminal reads customer checks, calculates sales taxes, prints out total amounts and visually displays amounts in 1.5 sec for three Sears Tower restaurants.

When waitresses take orders, they make pencil marks in appropriate boxes on the preprinted customer checks and place these checks in the entry trays of the remote kitchen terminals. The terminals read the checks, calculate sales taxes, print out total amounts and visually display amounts in 1.5 sec.

If an error is made in marking, the check is rejected while an error code is displayed, identifying the source of the error so it can be corrected.

Waitresses must process all customer checks on kitchen remote terminals before presenting the checks to the kitchen for order filling, thus ensuring each customer order is fully captured by the POS system. Waitresses then present food orders and checks to customers.

When customers leave, they present the checks and payments to cashiers who process them on the cashier terminals, completing transactions. As a by-product of terminal operations, all data is stored in memory for recall on a need-to-know basis.

Variety of Reports

At any time of the day, the master terminals can then be used to produce a variety of different reports. Summary reports, for example, show the number of each different type of item sold, making it possible to plan purchases and control inventory better.

A waitress productivity report shows sales by class of item in terms of items and dollars. Waitress tip reports, missing check reports and item price lists can also be produced at any time.

At the end of each day, complete revenue and cash reports are automatically produced for balancing purposes.

"The systems were not installed without problems," Stanczak said. "There was a breaking-in period during which our people had to learn to understand and properly use the systems.

"However, the systems are now running smoothly and providing increased speed, accuracy and control, enabling us to do a better job of management," he concluded.

DAA Death Brings Query: 'Now What?'

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – After the DAA, what?

That is the question being asked in the wake of the Federal Communications Commission's (FCC) decision to eliminate the need for Data Access Arrangements as of April 1976 [CW, Nov. 12].

The biggest question mark associated with the FCC's ruling is what AT&T will do next. A Bell spokesman said the phone company is still carefully reviewing the decision, but its exact reaction has not yet been determined.

Meanwhile, some users are speculating on what the data communications environment will be like when DAAs are no longer required – and they are getting few answers from their suppliers.

There is, of course, that simple option of doing nothing. The FCC has made provision for a "grandfather clause" that would allow all installed DAAs to remain in place on dial-up lines behind noncarrier modems.

Presumably this set-up would remain intact as long as the user can resist sales pressures from his vendor to change.

Status Quo Not Viable

But the status quo is not a viable solution. Obviously users will want to eliminate the recurring monthly rental for the DAA in favor of a device which could be purchased and written off for tax purposes.

The FCC ruling gives vendors (and users) the option of getting their modems certified by an outside agency and then registered for use by the FCC. This procedure assumes the inclusion of protective circuitry similar to the DAA inside the certified and registered unit.

The simplest way to add the protective circuitry to an installed modem would be to add a circuit board in the field. But

Analysis

most noncarrier modems do not have provision for such an added board.

The board itself would be relatively low-cost, probably about $50 for a manual DAA equivalent and about $100 for an automatic DAA equivalent. But if the data set could not handle such a field change, it might have to be returned to the supplier for modification.

If so, what would the user do while his modem was being retrofitted?

For the user who decides to have his noncarrier modems certified on his own, the cost probably would range somewhere between $2,000 and $5,000. That is the estimate required to meet the California certification standards [Oct. 29]. And the FCC certification tests were described as somewhat less severe by engineering experts.

Affect on Quality

If users begin using certified/registered devices on dial-up lines, the quality of the phone facilities might be affected, according to one user.

The phone company usually makes an effort to provide a clean local loop to the nearest central office when a DAA is being installed, this user said. Without a DAA, the phone installer might merely provide the termination block for a user to hard-wire a certified/registered unit, he said.

A check with the phone company confirmed Bell has standard practices associated with line quality when a customer orders a Bell data set or a DAA. The exact procedures vary with the speed that data will be transmitted, but local representatives will provide a clean local loop that is tailored for data use, an AT&T technical expert said.

One of the most interesting alternatives for the user with a large installed number of noncarrier modems and DAAs would be to buy the DAAs from the phone company. With an estimated 120,000 DAAs of all types in the field, Bell might look for a graceful way to dispose of the couplers, and selling them to the owners of the modems might be one way out.

But that would leave the question of maintenance. Will Bell maintain DAAs it no longer owns or will the user have to assume this task?

One regulatory expert said it was premature to raise this type of question. In his opinion, Bell will delay the implementation of a non-DAA environment as long as possible by using regulatory and legal means.

No matter how long the various appeals take, the user will one day have to address the question: "After the DAA, what do I do?"

So far there are few answers.

Dataspeed 40 Rates Filed

WASHINGTON, D.C. – AT&T has filed tariffs to cover its synchronous clustered configurations of the Dataspeed 40 CRT [CW, Nov. 12].

The interstate rates will go into effect on Dec. 18 unless suspended by the Federal Communications Commission.

Packet-Switched Net to Offer 'Virtual Circuit' Service

TORONTO – The packet-switched Datapac network will be providing a "virtual circuit type of service" when it begins operations in mid-1976, according to A.M. McMahon, vice-president of the Computer Communications Group at Bell Canada.

Speaking at a recent conference sponsored by the Canadian Information Processing Society here, McMahon said three basic Datapac services will be offered initially.

The first, called Datapac 1000 service, is aimed at point-of-sale and credit-check users. It will support essentially dumb terminals through what is known as a Network Interface Machine (NIM) and allow access to a variety of data bases.

The second service, Datapac 1500, will allow intelligent terminals using the Standard Network Access Protocol (Snap) to access a variety of host computers that also use Snap.

This service is aimed at the inquiry-response user, with particular emphasis on elements of the payment system, such as on-line banking, McMahon said.

The third service is Datapac 2100, which also uses a NIM. It will support teletypewriter terminals at the input/output end and interface with host computers in a Snap format. It is aimed at the time-sharing user.

Four Serving Exchanges

Initially, there will be four Datapac serving exchanges in Canada. These will be located in Montreal, Toronto, Ottawa and Calgary.

Between 1976 and 1980, about 16 additional nodes will be added as required. However, from the start, the rates will assume the existence of 20 Datapac serving exchanges.

Internal trunking between the nodes will be on 56K-bit synchronous digital Dataroute facilities. The Datapac switch, developed by Bell Northern Research and built by the Northern Electric Company, is a multiprocessor data switching machine with both packet and circuit switching capabilities.

The entire system is a product of Canadian design, engineering and manufacture, McMahon noted.

A number of modes of operation will be supported. The mode that will give the most complete range of benefits is the one using the Snap protocol, McMahon said, noting this will require having intelligent terminals and computers equipped with Snap.

Service to nonintelligent terminals will be provided by the use of NIMs. These NIMs will provide the terminal handling, concentrating and packetizing functions for presentation of this traffic to the network.

For the remote job entry type of terminals, there will be a frame-switching mode of operation. For data transfer between these terminals and their host computers, the network will be transparent and will provide a virtual circuit connection, he said.

Situation 'Promising'

McMahon said "the situation looks very promising for agreement on an international basis on a basic packet network protocol."

Eleven months ago, a set of preliminary specifications for the Snap protocol was introduced. "At that time, we said we wanted to have as much feedback as possible from users, universities, computer and terminal manufacturers, fellow carriers around the world and international standards organizations, with a view to improving this protocol to the greatest extent possible," he said.

Carriers Agree on Protocol

As a result of these discussions, the Snap protocol has undergone some significant changes. The world's major carriers (those involved in packet switching) are basically in agreement on the protocol that has evolved, McMahon said.

"The current status is that we hope to have a recommendation going forward to the February 1976 meeting of Study Group 7, which will turn it over to the 1976 Plenary Assembly of the CCITT for final approval," he added.

Specs Coming

In the meantime, Bell Canada will be publishing firm specifications for the Snap protocol this month. It will be a protocol that essentially has the concurrence of the major carriers involved in packet switching, McMahon said.

The protocol will be a nonproprietary protocol that any carrier, any user and any manufacturer – anywhere – will be free to adopt, he added.

The Datapac network has been working for a few months in a technology trial operating between Toronto, Montreal and Ottawa. This three-node trial will be expanded to a four-node, real-life trial phase early next year with a number of customers using it.

Service in July

Commercial service will start in July 1976 with the three services, he said.

In the spring of next year, the British plan to start operating a packet-switched service, experimentally. Telenet in the U.S. is already operating a commercial packet network. France will introduce its Transpac network in 1977 and Japan plans to start packet service in 1977 or early 1978, he said.

Net Reduces Firm's Inventory, Allows Same-Day Shipments

Special to Computerworld

MINNEAPOLIS – Using a network of intelligent terminals linked to computers, Van Dusen Air, Inc. not only reduced inventory levels and the investment associated with them, but also initiated a successful program of same-day shipments.

"Our primary objective was not to save money, but to improve service," William Larson, corporate DP manager, said.

Before the present network was established, Van Dusen used a manual Kardex system at each branch office to determine if inventory was in stock.

Each of its 20 domestic sales offices carried a complete inventory of diverse items, resulting in a large financial investment, frequent shortages of some items and delays in getting out-of-stock items to customers.

If an item was out of stock, the branch office mailed a requisition to its central warehouse at St. Louis for processing. The order would be keypunched and processed, pulled from inventory, grouped by the branch office and trucked on a weekly scheduled basis to the appropriate branch sales location where it would be distributed to the customer.

To cut down the required inventory investment at the individual branch offices and to reduce the time delays in getting out-of-stock items to customers, Van Dusen set up a network of three regional sales support centers in Teterboro, N.J.; St. Louis; and Los Angeles. In each, Van Dusen placed a System/3.

Larson explained that this relieved the individual offices of having to stock a full inventory of more than 10,000 items. The branches now carry the approximate 2,000 items which account for over 85% of their sales activity.

Communications Needed

However, this did not solve the more basic problem of how to distribute the inventory. To do that, Larson began a serach for a communications terminal.

His criterion was for a reasonably simple communications device, "because we are not a big IBM 370 user with hundreds of programmers to dedicate to any one project."

He also wanted a device which would be easy to relate to at the business end "with a CRT to follow the bouncing ball" and simple to install at a corporate level.

In February 1974, the first of these devices, a Sycor Model 340 intelligent terminal, was installed; by the fall of that year, terminals were in place at all 20 domestic locations. Since then, Sycor units have been installed in Winnipeg and Montreal, Canada.

Today, the network of Model 340s and System/3s is part of a system known as "Today Sure Order" (TSO). The system ensures that, if any order for an out-of-stock item is received at a branch office by 2:00 p.m., the item will be shipped the same day from the nearest sales support center direct to the customer.

Unattended Polling

Orders are placed through the terminal's typewriter-like keyboard during the day by entering a seven-digit customer account number and a six-digit (modulus 11 check digit) stock item number. The data is then polled unattended two or three times a day by the System/3 to find the out-of-stock items that must be shipped.

Acknowledgements of the orders are then transmitted back to the offices where they are printed out on 80 card/sec Sycor printers. The hard-copy report lets branch managers know the data was received and received correctly, so they can advise customers accordingly.

Later that evening, an updated inventory of the more than 10,000 items in stock at the regional sales support centers is sent to each branch office.

While Van Dusen Air still uses a manual Kardex system to fill orders from inventory in branch stock, future plans are for a terminal device to be used to handle on-site inventory control to relieve branch personnel of tedious Kardex maintenance work.

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Performance Evaluation and Improvement

Saul Simler, author of *Data Processing Systems: Their performance, evaluation, measurement, and improvement* will lead this two-day seminar on measurement techniques designed to save your installation money. As well as system performance at your own installation, topics covered include: Criteria for quantifying performance, pencil and paper analysis of a system, Benchmarking techniques, Realtime, Batch and Interactive time sharing systems.

Cost for the seminar, including continental breakfasts and luncheons and all course materials is $250.

San Francisco	**Dunfey's Royal Coach**	**Jan. 19-20**
New York	**Sammit Hotel**	**Feb. 9-10**

How to Increase Programming Productivity

John W. Brackett, PhD, Vice President of SofTech, Inc., will lead this two-day seminar for technical managers on the state of the art of Software Engineering. Under his direction you will learn how to: create more precise and visible analysis and design; reduce integration problems; improve software reliability; incorporate visible outputs into the software development cycle; increase programmer productivity; and improve programming management methods. Topics covered include: Structured programming; Top-down analysis, design, implementation; and Chief Programmer teams.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials is $300. Additional registrants from the same company are charged only $250.

New York	**Essex House**	**Jan. 26-27**
Chicago	**Hyatt Regency O'Hare**	**Mar. 8-9**
Wash.,D.C.	**Stouffer's National Center Inn**	**Apr. 6-7**

Legal Tools for Computer Contracting and Protection

Under the instruction of Roy N. Freed, a nationally known lawyer, author and educator in the field of computer law, you'll learn how to increase your advantage in dealing with vendors that supply your installation. As well as practical discussion and review of your own contracts, subject areas covered in this 2½-day seminar include: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, and Techniques for handling any transaction. Cost for the entire seminar, including continental breakfasts, luncheons and all course materials is $325. Additional registrants from the same company are charged only $275.

Wash., D.C.	**Marriott Crystel City**	**Feb. 4-6**
Orlando, Fla.	**Sheraton Towers**	**Feb. 18-20**
Seattle	**Airport Hilton**	**May 19-21**

Data Communications Course #1010 —Practical Data Communications Systems & Concepts

Dr. Dixon Doll, the nationally recognized teleprocessing consultant will lead this two-day seminar on the newest advances in data communications. The course covers areas like SDLC, HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of Satellite Carriers.

Total Cost, including workbook, reference materials luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for the reduced rate of $300

New York		**Jan. 26-27**
Chicago	**Hyatt Regency O'Hare**	**Mar. 15-16**

Data Communications Course #1020 —Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow-up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three-day seminar covers procedures, approaches, and algorithms for evaluating and cost-optimizing network operations. Total cost, including an extensive set of custom-laid course materials, is $450. Additional registrants from the same company qualify for a reduced rate of $400.

New York	**Essex House**	**Feb. 23-25**

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Three Alternative Communications Futures Predicted

OTTAWA – "The place of telecommunications – and, in a larger sense, of information technology – will be pivotal in the world now being reshaped," according to Dr. John M. Richardson, acting director of the U.S. Department of Commerce's Office of Telecommunications.

And yet, when ascertaining the forces of change on a national and international scale, "we really have no choice but to engage in some prophecy," Richardson remarked in a speech to the Canadian Information Processing Society here recently.

"I suggest that when we think about the impact of telecommunications, it may help to do so in terms of three alternative futures," he said.

"I have in mind, first, a 'technology-driven future'; second, a 'public policy-driven future'; and, finally, a 'market-driven future.'

"The total future of telecommunications will therefore be a complex mixture of market forces, political pressures and the dictates of technological development. But looming over all of this will be the greater phenomenon we call 'information technology,'" he continued.

"By the year 2000, surely, this 'information society,' with all its complexity, will be upon us. This special technology cannot be viewed in isolation. It will be part of a much greater whole," he predicted.

Technology-Driven Future

"The technical forces for change will be led by three key developments: the large-scale integration of electronic circuits; optical fiber communications; and the satellite, especially the higher powered variety," Richardson said.

"The first technology, massive integration of electronic circuits, gets us quickly to the heart of the information society: the linkage between the computer and sophisticated telecommunications technology," he said.

"Well before the turn of the century, we shall be working with 'smart' computer terminals in a multitude of ways.

"In 10 years we will have developed the hardware and software for local smart terminals that will do much of the logic and decision making now referred to a large remote computer by long-distance transmission.

"Moreover, it is the fast-developing digital world of data transmission that will, first, simplify the compatibility of smart terminals and communications lines and, second, reduce the cost of transmission to economic levels," he predicted.

Policy-Driven Future

The public policy-driven future will be characterized by central government planning done in the public interest. "The point is that telecommunications will reach such economic and social importance governments will wish to shape its development more positively. Technologically advanced systems will require more extensive regulation.

"In addition, it may become mandatory to plan multiuse systems so costs can be shared among many information-related public services such as health, employment and welfare," he said.

"As to the regulation, the avalanche of data that before long will be swirling about us thanks to the phenomenon of information technology will make imperative whole shelves of novel legislation. And to be sure, a corpus of such laws is now developing.

"It is important that we in the field become familiar with the areas most subject to this growing legislative activity," he stressed.

"Before we can have public policy problems to solve, we must first have the telecommunications systems in operation. And that implies the existence of buyers for them.

"Much of our available technology will lie dormant until a market appears to activate it," Richardson said.

"But in some cases, cost is not the problem," he said, citing the regulation barrier.

"If the way is cleared, in seven to 10 years we ought to have in our homes the services I described – everything from the library search to the want ads.

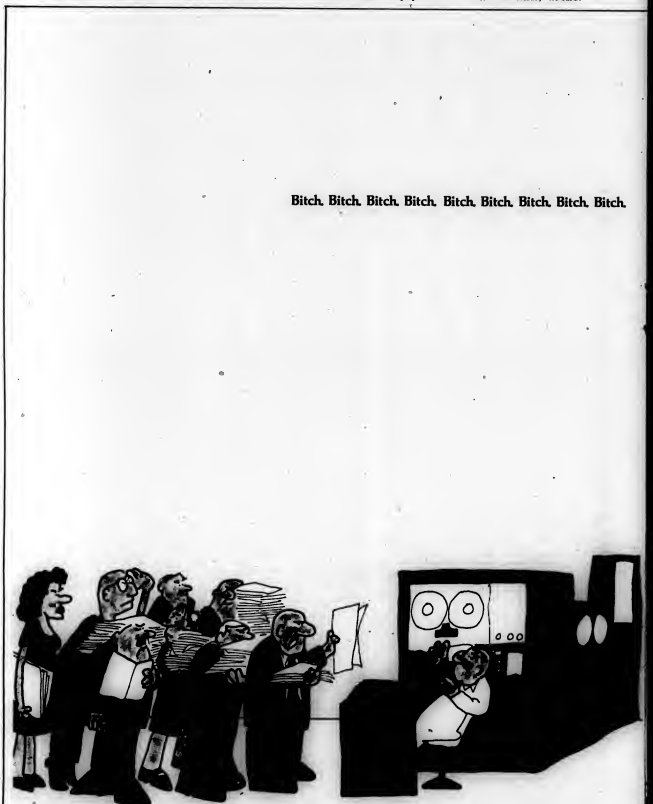
"Whatever turn the price mechanism takes, all the signs point to its happening on an international scale.

"Here is an authentic bright spot for telecommunications businessmen – they can count on a world market," Richardson said.

"Arthur D. Little, Inc. predicted a world market of telecommunications equipment of at least $40 billion a year by 1980, compared with today's total of only $15 billion."

"This will arise partly from the efforts of the less developed countries to achieve telecommunications parity with the advanced nations.

"Rest assured, however, that no single firm will be permitted to dominate this field. Valid national security considerations will demand that each nation take steps to ensure its telecommunications destiny remains in its own hands," he said.



Interfaces With Police Net

On-Line System Speeds Updating of Drivers' Licenses

Special to Computerworld

OLYMPIA, Wash. – Despite the obvious difficulties associated with two aging, overloaded computers, the Washington State Department of Motor Vehicles has been accomplishing on-line updating of records for a number of years.

The department has responsibility for driver licensing, vehicle registration and titling, fuel tax collection and proration, as well as licensing, registration and regulation for over 170 businesses, professions and occupations.

In addition, the department's Information Systems Division provides data processing services to several other agencies and commissions such as the Department of Labor and Industries, the Secretary of State's Office, State Board of Pharmacy and the State Gambling Commission.

In 1967, an existing IBM 1401/1410 magnetic tape batch system was converted to a dual Univac 70/45 on-line real-time computer system using 70/752 CRT terminals for input and 70/568-11 magnetic card mass-storage units for random access data storage. The dual 70/45s each have 262K bytes of main memory.

Under the old system, the vehicle titling process involved clerical receiving, title examination and coding followed by key-punch, key verification and batched input.

The new system involves a clerical receiving function followed by CRT terminal direct key-entry input to the random access files.

Employees, to function as combination title examiners and key-entry operators, were recruited from among existing title examiners and keypunch operators.

The title examiners/terminal operators now overlap the two processes by examining the next title for completeness and accuracy while awaiting the CRT display response from the previous title inquiry. Thus, when the record is displayed on the CRT screen, the perfected title is ready for the operator to key-in the record update transaction.

The normal 6-second to 7-second response time is adequate to permit optimum operator transactions.

Under the old system, the vehicle title backlog at times amounted to 120 calendar days of unprocessed transactions. Since conversion, the normal vehicle titling turnaround time is 10 days or less.

Field Station Access

In June 1968 a CRT video data terminal, connected to the computer by a leased voice-grade telephone line, was installed in the Olympia Drivers License Examining Station as a pilot to test the feasibility of field station on-line access.

Under the concept, an applicant's driving record is accessed and displayed on the CRT screen while the applicant is being tested or examined. The applicant's eligibility is established before a license is issued or renewed.

There are now over 280 terminals, including law enforcement, in-house and driver license examining stations, with on-line access to computer records.

Centronics Adds Impact Printers

HUDSON, N.H. – The Centronics Data Computer Corp.'s models 103 and 503 serial impact printers can provide 340 line/min output from either a CRT terminal or a minicomputer system, according to the firm.

The two models have electronics which permit bidirectional printing and the ability to logically seek the fastest path to the next print line, Centronics said.

A self-contained test print capability is offered as a standard feature on the Model 103 and as an option on the Model 503. The operator can use this capability to exercise the printer off-line to set up forms and check the printer's operations.

The printers can be linked to minicomputers and terminals through either serial, RS-232 or individual vendor interfaces, Centronics said.

The models 103 and 503 offer similar performance and features. The Model 103, however, has standard features that are compatible with earlier Centronics 100 series printers.

The Model 503 serves as a basic unit for the new customer or for the current Centronics 500 series customer who needs higher throughput, the company said.

The Model 103 costs $4,340 and the Model 503 $3,565. Deliveries will begin this month and in January respectively from the firm here in Hudson, 03051.

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Helping a Fast World Move Faster

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BCM Multimedia System Links Key-to-Disk, OCR

By Patrick Ward
Of the CW Staff

BOSTON – Blue Cross of Massachusetts (BCM) has a "mind-boggling" data-entry problem that no one technique can handle effectively, according to Robert Guida, manager of BCM's data-entry division.

In 1974, BCM captured 1.54 billion characters through its various data-entry methods, he noted.

One of BCM's answers to the problem is a "multimedia" key-to-disk optical character recognition (OCR) system that combines the advantages of both approaches, said Guida, who is director of the BCM multimedia center.

BCM continues to use shared processor, keypunch and on-line data entry for applications where they are appropriate, he said.

BCM first turned to OCR in 1972 to handle turnaround billing remittance forms from subscribers. Other applications followed.

One of the applications called for BCM to input alpha as well as numeric handprint information into the scanning system, "but this type of scanning is as yet unproven," Guida said.

"That led us to look for a solution that would allow us to scan as much data as we could on a document and then key enter the rest," he said.

When BCM installed a Scan-Data Corp. 2250/1 scanner system last spring, it soon interfaced it with a 10-station Scan-Data 2250/2 key-to-disk system. Each system has its own controller, but the OCR system shares the key-to-disk system's disks.

Correcting Documents

Currently users handprint alphanumeric information on turnaround correction documents which go directly into the scanner. This document has both OCR A characters and handprint alphanumerics on it.

The Scanplex 1 CRT directly attached to the scanning unit is used for correction of all rejected OCR A and numeric handprint characters, Guida explained. A 2250/2 terminal attached to the 2250/2 key-to-disk system is used for entry of the handprint alpha characters the system can't recognize, he added.

CRT operators in the Blue Cross of Massachusetts Multimedia Center can both correct rejected characters and key in nonscannable data as the OCR system reads documents.

While the entry of the alpha characters for the application goes on in the multimedia room itself, user departments also key in nonscannable documents through remote 2250/2 stations.

This was one job formerly done at BCM's central data conversion shop, but since the 2250/2 keystations can be located apart from their processor, IBM decided to shift this key-entry function out to the users.

"We know that we need to have a centralized data-entry capability in the data conversion department, but we're also attempting in several ways to capture data at its source," Guida said.

In dealing with rejected documents, the users can fix the problems right in their offices, where the backup documents and knowledgeable people are, Guida said.

The user can key in at his 2250/2 terminals, batch balance the results and then release the data to the mixed-media system when he is satisfied with its correctness, Guida said.

This prevents flow of correction documents back and forth between the user departments and the mixed-media system, he said.

"We can be scanning documents, we can be correcting rejected characters from a previous scanning job or we can be entering additional data either locally or remotely into the 2250/2 system all concurrently," he said.

NCR Adds Multiple-Use Cash Register

DAYTON, Ohio – NCR Corp. has expanded its family of electronic cash registers with the introduction of the NCR 225, available in two versions.

Equipped with a microprocessor, the NCR 225 is being offered to perform back-office tasks such as check endorsement, end-of-day balancing and auditing.

Such tasks are simplified through individual identification of cashiers and through identification and automatic totaling of the various media used for payment, the firm said.

As a report printer, it can produce a variety of department, financial and exception reports.

In addition to automatic tax calculation, quantity extension and item repeat, the 225 offers Clear, Error Correct and Void keys which can be used to correct entry errors during a transaction.

NCR 225

The general-purpose model, priced at $2,695, is designed for department and specialty stores, variety stores, supermarkets, discount stores and other general retail outlets.

The "preset" model, which was developed for restaurants and fast-food operations, features up to 36 preset keys and is priced at $2,895.

Function keys are color-coded to aid cashiers in their transition from electro-mechanical to electronic registers, NCR noted.

The 225's three separate printers simultaneously print a customer receipt and a sales journal and validate inserted forms with register-printed figures. As an option, the 225 can be programmed to require insertion of a form on all charge transactions.

The 225 can handle any type of transaction at the point of service, including cash, charge, check, credit card, return, received-on-account, refund and paid-out transactions, the firm said.

Charge transactions are handled the same as cash up to the final key entry. The 225 can also enter a previous balance and update a customer's charge account card and monthly statement.

On completion of the charge transaction, the customer has audited the account and has given an account statement as of the last transaction. As the customer leaves the store, both the customer and the store know the status of the account as of the last transaction, an NCR spokesman said.

The general-purpose 225 is available for immediate customer delivery. The preset model will be available this month.

CDI Has Entry-Level Monitor

WATERLOO, Ont. – The Model 3000 Tricorder from Computer Performance Instrumentation, Inc. (CPI) is an entry-level hardware monitor for the mid-range computer user.

Costing $4,950, the Model 3000 can help users keep track of CPU or peripherals utilization, CPI said. The device can also ease the user's scheduling task by identifying loads on the system, a spokesman said.

The basic Model 3000 captures performance data through its 12 probes and displays it in real time on one or more video screens. Chart or pen recorder output is also standard.

The optional Model 3350 recorder/communicator has a cassette which stores 24 hours of performance data. The recorder/communicator can emulate an Ascii terminal to transmit that data back to the mainframe.

Alternatively, the host CPU can repeatedly poll the recorder/communicator to make sure the system has not exceeded a performance parameter set by the user. If the system has, an alarm sounds.

Data can also be collected on the optional Model 3460 1/2-in. magnetic tape controller, the spokesman noted.

In addition to the hardware, CPI provides software that can analyze the recorded data. Presently the firm is offering software for both IBM 360 and 370 machines and the Honeywell 6000 series, according to the spokesman.

This software can produce reports on system utilization or the percentage of time a channel was active, CPI said.

The system can also measure contention on shared disks and the percentage of active time for seeks across the disk, but cannot produce a map of the seek activity for a given disk.

CPI is at 572-7 Weber St. N., N2L 5C6.

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One of the applications called for BCM to input alpha as well as numeric handprint information into the scanning system, "but this type of scanning is as yet unproven," Gunda said.

"That led us to look for a solution that would allow us to scan as much data as we could on a document and then key enter the rest," he said.

When BCM installed a Scan-Data Corp 2250/1 scanner system last spring, it soon interfaced it with a 10-station Scan-Data 2250/2 key-to-disk system. Each system has its own controller, but the OCR system shares the key-to-disk system's disks.

Correcting Documents

Currently users handprint alphanumeric information on turnaround correction documents which go directly into the scanner. This document has both OCR-A characters and handprint alphanumerics on it.

The Scanplex I CR1 directly attached to the scanning unit is used for correction of all rejected OCR-A and numeric handprint characters, Gunda explained. A 2250/2 terminal attached to the 2250/2 key-to-disk system is used for entry of the handprint alpha characters the system can't recognize, he added.

While the entry of the alpha characters for the application goes on in the multimedia room itself, user departments also key in nonscannable documents through remote 2250/2 stations.

This was one job formerly done at BCM's central data conversion shop, but since the 2250/2 key stations can be located apart from their processor, IBM decided to shift this key-entry function out to the users.

"We know that we need to have a centralized data-entry capability in the data conversion department, but we're also attempting in several ways to capture data at its source," Gunda said.

In dealing with rejected documents, the users can fix the problems right in their offices, where the backup documents and knowledgeable people are, Gunda said.

The user can key in at his 2250/2 terminals, batch balance the results and then release the data to the mixed-media system when he is satisfied with its correctness, Gunda said.

This prevents flow of correction documents back and forth between the user departments and the mixed-media system, he said.

"We can be scanning documents, we can be correcting rejected characters from a previous scanning job or we can be entering additional data either locally or remotely into the 2250/2 system all concurrently," he said.

CRT operators in the Blue Cross of Massachusetts Multimedia Center can both correct rejected characters and key in nonscannable data as the OCR system reads documents.

NCR Adds Multiple-Use Cash Register

DAYTON, Ohio — NCR Corp has expanded its family of electronic cash registers with the introduction of the NCR 225, available in two versions.

Equipped with a microprocessor, the NCR 225 is being offered to perform back-office tasks such as check endorsement, end-of-day balancing and auditing.

Such tasks are simplified through individual identification of cashiers and through identification and automatic totaling of the various media used for payment the firm said.

As a report printer, it can produce a variety of department financial and exception reports.

In addition to automatic tax calculation, quantity extension and item repeat, the 225 offers Clear, Error Correct and Void keys which can be used to correct entry errors during a transaction.

The general-purpose model, priced at $2,695, is designed for department and specialty stores, variety stores supermarkets, discount stores and other general retail outlets.

The "preset" model, which was developed for restaurants and fast-food operations, features up to 36 preset keys and is priced at $2,895.

Function keys are color-coded to aid cashiers in their transition from electromechanical to electronic registers NCR noted.

The 225's three separate printers simultaneously print a customer receipt and a sales journal and validate inserted forms with register-printed figures. As an option, the 225 can be programmed to require insertion of a form on all charge transactions.

The 225 can handle any type of transaction at the point of service, including cash charge, check, credit card, return, received-on-account, refund and paid-out transactions, the firm said.

Charge transactions are handled the same as cash up to the final key entry. The 225 can also enter a previous balance and update a customer's charge account card and monthly statement.

On completion of the charge transaction the customer has audited the account and has given an account statement as of the last transaction. As the customer leaves the store, both the customer and the store know the status of the account as of the last transaction, an NCR spokesman said.

The general purpose 225 is available for immediate customer delivery. The preset model will be available this month.

NCR 225

CDI Has Entry-Level Monitor

WATERLOO, Ont. — The Model 3000 Tricorder from Computer Performance Instrumentation Inc (CPI) is an entry-level hardware monitor for the mid-range computer user.

Costing $4,950, the Model 3000 can help users keep track of CPU or peripherals utilization, CPI said. The device can also ease the user's scheduling task by identifying loads on the system, a spokesman said.

The basic Model 3000 captures performance data through its 12 probes and displays it in real time on one or more video screens. Chart or pen recorder output is also standard.

The optional Model 3350 recorder/communicator has a cassette which stores 24 hours of performance data. The recorder/communicator can annotate an Ascii terminal to transmit that data back to the mainframe.

Alternatively, the host CPU can repeatedly poll the recorder/communicator to make sure the system has not exceeded a performance parameter set by the user. If the system has an alarm sounds.

Data can also be collected on the optional Model 3360 1/2-in magnetic tape controller the spokesman noted.

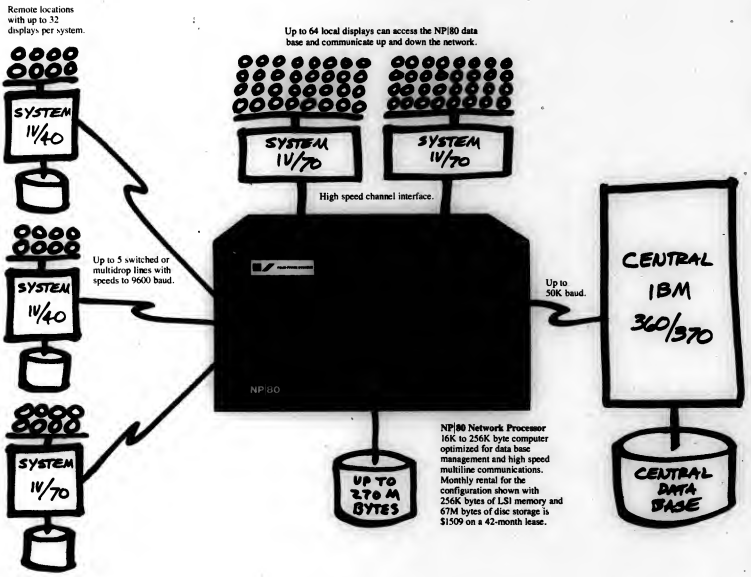
In addition to the hardware, CPI provides software that can analyze the recorded data. Presently, the firm is offering software for both IBM 360 and 370 machines and the Honeywell 6000 series according to the spokesman.

This software can produce reports on system utilization or the percentage of time a channel was active, CPI said.

The system can also measure contention on shared disks and the percentage of active time for seeks across the disk but cannot produce a map of the seek activity for a given disk.

CPI is at 532-7 Weber St. N., N2L 5C6.

NP|80: The new Network Processor that distributes your data the way your company is organized.



Hierarchical networks for hierarchical organizations.

Makes sense doesn't it. Ideally, information should flow up and down a network as it does in an organization . . . with geographically distributed files at branch, district, and regional locations in keeping with departmental scope and span of control.

But until now, a simple solution for these intermediate sites has not been readily available.

What's needed is a new kind of processor that can complement today's remote systems by filling the gap between the lowest level in the network and the central office. What's needed is a unique computer for large regional and district sites . . . optimized for distributed data base management and wideband multiline communications.

What's needed is the NP|80—the new Network Processor that distributes your data the way your company is organized.

NP|80—the missing link.

Four-Phase Systems' NP|80 is a new computer system that complements and extends the capabilities of our popular System IV/40 and System IV/70, field proven with over 70 million operator hours.

Designed for use at intermediate network locations, the NP|80 lets you distribute computing power and data files naturally throughout your organization while preserving compatibility with both current line disciplines and IBM SDLC protocol.

Up to 64 local displays can access an NP|80 data base of up to 270 million bytes through direct channel connection of two System IV/70's.

These same displays can also access your central data base at speeds up to 50K baud through the NP|80's wideband communications facilities.

While performing data base management and communications services for the local System IV/70's, the NP|80 can concurrently provide master multipoint control for an extensive network of remote Four-Phase systems with speeds up to 9600 baud.

Now each level of an organization can store frequently used data in local system files for interactive access. At the same time, operators can retrieve information stored at higher and lower levels throughout the organization.

As a result, system response patterns can be matched to local requirements through flexible application of total network resources.

Multilevel network access.

Multilevel distributed processing adds a new dimension to remote computing.

Displays at remote locations can access local, regional, and central files with automatic routing based on data availability. Typically, most transactions will be processed against local files while exception transmissions are passed to the next highest level.

Similarly at regional sites, transaction processing can be supported by both local and central files while down line communication is pipelined through the NP|80 with negligible CPU loading.

Central control with local autonomy.

Now line managers can assume responsibility for the data processing they require. Needed reports and documents are easily generated at remote locations using COBOL, RPG, Sort, Assembler, DOS, and an extensive selection of utilities. And programming can be done either locally or at headquarters.

For data base synchronization, branch and regional files can be updated from the central site. Detailed information in these files can also be accessed by headquarters when required.

Complete freedom exists to tailor networks exactly to your needs. Regional NP|80's can communicate with district NP|80's which in turn can communicate with branch System IV/40's and System IV/70's.

Through such multilevel processing, the NP|80 offers large network users enhanced system performance, increased functional capability, expanded display support, reduced mainframe loading, hierarchical fallback, and greater flexibility in meeting changing or expanding requirements.

Distributed data management.

NP|80 network control and data management services are provided by a resident multiprogramming executive. While transparent to system users, the NP|80 can concurrently support shared file access and high speed communications for separate application programs on two System IV/70's.

The NP|80 performs indexing, searching, and deblocking operations for the attached System IV/70's while handling communications concentration for the lower level systems. Blocks of up to 128 sectors may be read or written by the NP|80 with a disc transfer rate of 1.2M bytes/second.

The parts we needed didn't exist, so we had to make them ourselves.

Magnified view of Four-Phase's new 16K-bit n-channel silicon gate RAM.

In 1970 we introduced the industry's first computer with LSI semiconductor memory and an LSI central processing unit.

In 1972 we shipped the industry's first systems with 2K LSI RAM's.

Now with the NP|80, we've created another milestone—*the first computer to be introduced with 16K LSI RAM's.*

We design and manufacture not only the displays and computers employed in our systems, but also the LSI components used in them. Not because making semiconductors is our business. But because producing the most advanced distributed processing systems is.

256K bytes of network processing power.

This hand contains all the 16K-bit RAM chips needed for the NP|80's 256K byte memory with error correction.

The heart of the NP|80 is a powerful 16-bit computer with 500 ns cycle time and up to 256K bytes of LSI memory.

The system includes multiple DMA channels, software and hardware error recovery facilities, firmware diagnostics, a memory relocation and protection system, and communications control for up to six high speed lines.

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Graphics Systems Added by Adage

BOSTON – Adage, Inc. has announced two interactive refresh graphics computer systems.

The Adage GP/400 independent graphics peripheral incorporates a 200 nsec microprogrammed graphics processor that implements complete graphics language in firmware.

Processing of all graphics commands and sampling of all console devices is handled internally to the graphics peripheral with no demands on the host computer. Free of machine-dependent graphics software, the GP/400 can be used with any customer-specified host computer, Adage said.

The Adage GS/300 interactive computer graphics system is an integrated hardware/software system incorporating the same 200 nsec microprogrammed graphics processor as the GP/400 in addition to a general-purpose digital computer.

The GP/400 costs $45,000 and the GS/300 costs $107,000 from the firm at 1079 Commonwealth Ave., 02215.

Two Fiche Standards Get Ansi's Approval

SILVER SPRING, Md. – The National Micrographics Association (NMA) has announced acceptance of two micrographics standards and the availability of a micrographics reference book.

The American Standards Institute (Ansi) PH5.9-1975 standard replaces both Ansi PH5.9-1970 and NMA MS5-1972, the NMA said. It covers distribution microfiche of documents generally not exceeding 8-1/2 in. by 11 in.

The Ansi PH5.22-1975 standard covers dimensions and operational constraints for double-core cassettes for 16mm processed microfilm.

Reference Text

The reference text, *Micrographic Systems* by Daniel M. Costigan, was described as both a reference source for the micrographics specialist and an introduction to micrographics for the novice.

The two standards cost $3 for members and $4 for nonmembers. The reference text costs $12.50 for members and $16.50 for nonmembers from the NMA's Publication Sales Office at 8728 Colesville Road, 20910.

has it. Why wait?

Now you can get the 3348, or "Winchester," Data Module, with all the quality and error-free performance that the name BASF implies . . . and at a competitive price.

The "Winchester" Data Module is a completely self-contained unit, incorporating heads, spindle, and recording surfaces in a protective factory-sealed pack. You've heard of the advantages of this new technology . . . complete security from environmental contamination, improved high-density storage, and incredibly fast access. Now you can enjoy this premium performance without paying a premium price.

Here are the facts, in brief: • Complete compatibility with 3340 drives • BASF-guaranteed Zero-Error performance • Now available in two configurations. . . . The 1335 Module, with 35 million-byte capacity, and the 1370 Module, with 70 million-byte capacity • Our 137OF Module, with fixed head and quicker access, will be available later.

For complete details on the BASF "Winchester" Data Module, write: BASF Systems, Crosby Drive, Bedford, MA 01730, or call our nearest regional office . . . in **Los Angeles,** (213) 451-8781; in **Chicago,** (312) 343-6618; and **Clifton, N.J.** (201) 473-8424.

You're already paying for BASF quality. . . you might as well have it.

"In the time it took to say 13 transactions, the PDP-11/70 did them."

David Kosko, Digital Test Programmer

It started last June with a report out of Cleveland. One of the customers said he ran close to 500 transactions a second doing analog inputs. Then another report came in. A New York bank set a record of 3.2 transactions per second doing multiple data base tasks. Across the country, more and more customers were amazed at the throughput power of the 11/70.

We weren't. Some time ago, we conducted a test of our own in the lab, based on a customer service application adapted from an actual situation. If we had hit 3 or 4, most people would have been amazed. What we got was 13 transactions per second, hour after hour. Our $200,000 computer performed like a million-dollar main frame.

The question: how could it happen? There are at least 5 reasons.

Reason 1. Total systems speed. The 11/70 is designed for speed both inside and out. Not just the processor, but the software, the cache memory, the I/O channels, the disks, the peripherals. In fact, the complete package is especially designed to run a lot of data. In a hurry.

Reason 2. Up to 2 million bytes of core memory. Attached to a 2k byte, 240 nanosecond bipolar cache. (Uniquely, the cache acts like a high speed buffer between the main memory and the CPU, and just as uniquely this results in an effective memory cycle of under 400 nanoseconds.)

Reason 3. The 11/70 uses high speed dedicated I/O busses. These busses can transfer data from a disk as fast as 1 megabyte per second. And the disks themselves can be expanded to give you up to 700 million bytes of storage on-line.

Reason 4. The 11/70 can be accessed by hundreds of terminals. What's more, you're not limited to just a few standard disks and terminals. Instead, you can choose from 60 different peripherals including a variety of line printers, tape drives, disk systems, and more. Much more.

Reason 5. Your choice of three operating systems. IAS lets you do batch, real-time, and time-sharing tasks – all at the same time. Or you can choose our dedicated operating systems, RSTS/E for timesharing. And RSX-11 for real-time. With languages to match. ANSI-74 COBOL, extended BASIC, MACRO assembler, FORTRAN IV.

The PDP-11/70 gives you a throughput breakthrough. At a breakthrough price. For more information, call your nearest Digital representative. Or write Digital Equipment Corporation, Maynard, Mass. 01754. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada, Ltd.

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50,000 computers saving managers millions.

13 Transactions/Second Defined. To show how the 11/70 handles data, we set up a real-life transaction processing application. We used standard 11/70 hardware. Standard RSTS/E software. And a standard commercially available data base stored across two disk packs. Then we wrote an applications program to allow 27 users to simultaneously query and update the file. The 11/70 responded at a record 13 transactions per second. With an average 2.6 disk accesses per transaction, including the read/write/verify sequences in file updates.

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Key-to-Disk Exceeds Small Site's Savings Expectations

IRVINE, Calif. – A dollar savings eight times greater than estimated and numerous intangible benefits have resulted from a switch to key-to-disk data entry equipment at the Aerospace Group headquarters here of Parker-Hannifin Corp.

The net savings after installation of an Inforex system was $375/mo compared with an estimated savings of $47/mo, according to Jim Sullivan, manager of management information services at the facility.

"Because this installation is considered small, with only four keypunch and verify devices and six operators on two shifts, economy became a major factor in justifying a change," Sullivan said.

Parker-Hannifin is a manufacturer of fluid systems and components for industrial, automotive and high-technology markets.

The greater savings at the Aerospace Group resulted from increased efficiency, greater production, reduced card consumption and reduced overtime labor costs, Sullivan explained. Equipment costs were slightly more, however.

The intangible benefits that came to the group after it installed an Inforex System 1301 with four keystations in January 1974 and returned its four Univac 1700 keypunches and verifiers include:

- Improved data entry keypunching production levels by about 25% to 30%.
- Improved accuracy in entering and verifying data.
- Improved computer operations efficiency.
- Improved data entry input format flexibility for application system design.
- An enhanced working environment for the data entry operators.
- Consolidation of data from remote sites, via communications lines, on a timely basis.

Additional benefits have accrued to the Irvine facility since the installation, Sullivan said, including ease in developing new application programs and use of data communications.

"One of the major intangible justifications was the development of a computer-assisted production and inventory control system," he noted. "The heart of this system is a bill of material for each product that we manufacture.

"We felt that if we were restricted to an 80-character input card, the redundancy of required fields would put serious limitations on our data entry function, as well as complicate the update program with numerous input formats.

"The key-to-disk equipment provides us with larger input records and, with the use of the reformat feature, we cut our estimated cost of data capture to 20% of original estimates," Sullivan said.

Sales Orders Gathered

The data communications function on the Inforex 1301 is used to gather sales orders from a plant in upstate New York and to transmit shipping data back to that plant, Sullivan explained.

The New York facility uses an intelligent terminal as a stand-alone data collection device for new sales orders and for shipping data during its normal business day, which is three hours different from the Irvine headquarters.

"We use a dial-up phone call daily to read out the New York plant's accumulated data, include it in our daily processing and then transmit shipping data back to it," he said.

Tangible savings – not including the monthly rental cost for keypunch equipment vs. Inforex key-to-disk equipment – come from reduced punched card costs and reduced labor costs, he explained.

Average card use prior to conversion to key-to-disk was 363,000 cards per month. Six months after installation, the card usage dropped to 122,000 cards, resulting in a savings of $248/mo. A savings of $206/mo had been estimated.

"A combination of overtime and part-time help was used to maintain keypunch production levels to minimize the data bottlenecks in the DP department," Sullivan said. "That required 100 man-hours per month for the three months prior to installation.

"Although overtime cannot be eliminated completely, it should remain in the 10- to 20 hours per month range," he said. In June 1974, overtime averaged 13 man-hours, resulting in a savings of $435/mo compared with an estimated $150/mo.

Production Increases

"The Inforex equipment provides us with a great deal of data on the operator's performance, as well as individual job characteristics," Sullivan said. "Such information was not obtained easily, if at all, from the standard keypunch machines.

"For instance, we have seen production levels improve by almost 50% between December 1973 and March 1974. This is measured in cards punched per keypunch hour.

"And we have seen the detected error rate – mistakes made by a keypuncher and caught during verification – fall to 1.23% in June from 4.75% in December."

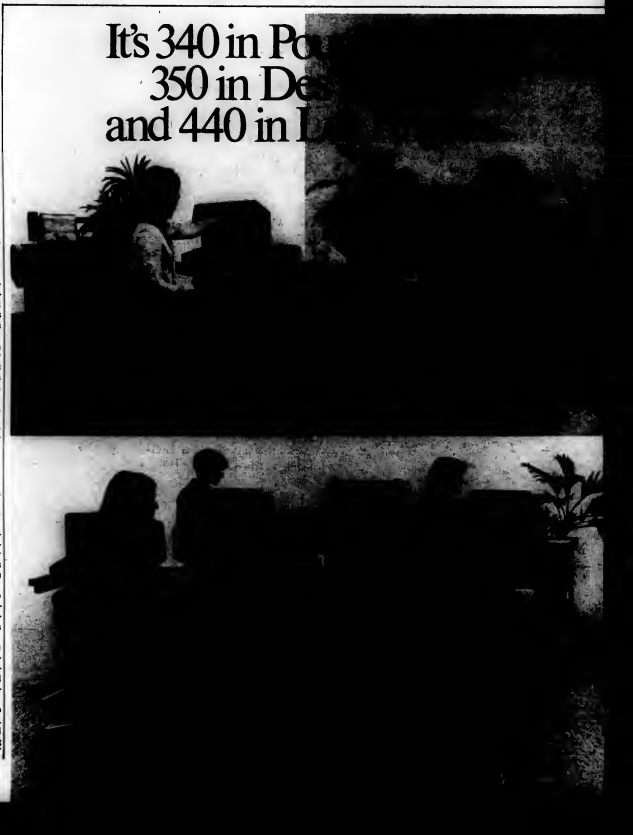
There are two ways to summarize increases and decreases in productivity at the Irvine facility: the monthly DP labor distribution report that shows all expenditures of department personnel time and runtimes for each job; and the logs for source documents submitted to keypunching and for data received in the computer room for processing.

To determine changes in man-hours per day productivity after installation of the Inforex data entry systems, Sullivan selected typical months before and after installation for the order processing, work-in-process and shop labor systems.

The order-processing production increased 56%, with man-hours per day dropping from 10 in October 1973 to 4.4 in March 1974. Work-in-process production increased 30%, with man-hours per day dropping from 6 in October to 4.2 in March. And shop labor production increased 38%, with expended man-hours dropping from 5.2 in October to 3.2 in March.

Delivered Sooner

A second measure of performance is the effect the conversion to key-to-disk data entry has on computer operations. Prior to installation of the Inforex system, work delivered to the keypunch department around 5 p.m. was processed and delivered to the computer room at 11:30 p.m. Now the same work is being delivered to the computer room three hours earlier, or at about 8:30 p.m.



360 Replaced by Univac 90/30

Hospital's Budget $1,500/Mo Less After CPU Switch

NEW ALBANY, Ind. – When Memorial Hospital, a 260-bed, nonprofit institution here, saw it could replace its 24K IBM 360/22 with a 32K Univac 90/30 for $1,500 less a month, it went ahead and did it for "strictly financial considerations," according to Shirley Michael, DP manager.

But the Univac system also offered a higher internal speed, more disk capacity and greater growth potential at the lower price, she added.

Installed in April, Memorial Hospital's 90/30 has two disk subsystems with a total storage capacity of 57.9M bytes, a card reader operating at the rate of 500 card/min, a card punch and a printer with a speed of 500 line/min.

The system has a processing speed of 600 nsec.

The conversion of all existing programs from the 360/20 to the 90/30 was accomplished with relatively no problems within two months, she said.

The RPG-II programs were recompiled for the 90/30 at a Univac office in nearby Louisville, Ky.

"During the changeover period, we received excellent cooperation from all departments of the hospital," Michael noted. "They allowed us to freeze all of our programs while we made the conversion.

"As a safeguard, we ran our patient billing and inventory control programs in parallel for two weeks until we were sure everything was proceeding satisfactorily.

"From our experience to date, we feel our switch to the 90/30 was a sound decision that has given us a number of important benefits.

"Perhaps most important is the fact that we are operating more economically than before with an average cost savings of $1,500/mo.

"Additionally, we can perform many more tasks in a lot less time than previously. We also have the growth capability to expand the system if required by merely adding more memory or peripherals without the need to replace the entire system."

Keeps Tabs on Expenses

Keeping close tabs on expenses in all departments is a major chore for Luther Wyrick, the hospital's associate administrator. He views the hospital's computer as a valuable asset in his work.

"We couldn't run a hospital this size today without computer assistance," Wyrick noted.

"Over the last few years the volume of paperwork we have to process has multiplied enormously. I hate to think how we could cope with it manually.

"We're also receiving a considerable amount of management information from the system that would be almost impossible to obtain manually except at exorbitant cost.

"From this data we can spot trends much earlier in such areas as labor distribution and departmental overspending and take appropriate action before it becomes a severe problem."

Three Billing Files

One of the computer's major tasks is handling the hospital's billing operation, always a sizable task for any hospital forced to cope with today's proliferation of insurance forms.

Three data files – one each for patient census, charges and insurance and kept in the same disk pack – are used to accomplish this operation.

Each time a patient is admitted, an admissions slip is received by the DP department from the admittance office. From this information, a new patient or census card is keypunched and a master record produced for the patient data files.

The census card indicates the patient's name, birthdate, date of admission and, later, the date of dismissal. It also lists station, room and bed number, physician's name, accommodation code (semi-private room or ward) and type of service (medical or surgical).

Insurance coding forms are also received from the admittance office. These trigger preparation of a second card known as a guarantor's card, which is keypunched and the information entered into the patient's record.

A final census report generates charges for rooms and other miscellaneous charges such as telephone calls and birth certificates. This information then becomes the input for the billing operation.

A record of purchase orders issued by the hospital's purchasing agent is kept in the computer's files. When the merchandise arrives another card is punched and the inventory records updated.

As supplies are released from the stores to the department needing them, inventory records are again updated and the departments receiving the supplies have their accounts charged against their budget allocation.

At the end of each month, a statement of the purchase orders paid is sent to the DP department by the hospital's business office listing the amounts paid to vendors.

A weekly stock status report is prepared which details the amount of medical/surgical, X-ray, laboratory and dietary supplies on hand, how much was ordered during the week, how much was received during the week and how much was issued to departments.

Another report is prepared weekly on open purchase orders as a reminder to the purchasing agent to "chase up" the vendors concerned.

The computer generates automated purchase orders for supplies used frequently and these are sent to the purchasing agent for his signature.

The purchasing agent receives a report at the end of the month of items paid for as well as an item distribution run showing items dispensed to different departments.

On a monthly basis, an item distribution is run for each of the hospital's 16 departments showing the total number of items and the amount of money charged to each unit. A recapitulation of these charges is supplied to the business office.

New

DATA 100 model 77

powerful, intelligent remote data entry and batch communications . . . for only $328/month*

Look for more elements o distributed processing systems from DATA 100 throughout 1976

DATA 100 CORPORATION

Operators check control-room instruments at Georgia Pacific Corp.'s PVC plant in Plaquemine, La.

In Plastics Plants

Minis Reduce Risks to Workers

SAN LEANDRO, Calif. – Minicomputers are now being used to help reduce risks to employees in the process of making polyvinyl chloride (PVC), a plastic widely used in pipe, pipe fittings and packaging.

Varian Data Machines Series 620 minicomputers are controlling chemical reactors at three large new plants that manufacture PVC.

The three plants are operated by Georgia Pacific Corp in Plaquemine, La.; Shintech, Inc. in Freeport, Texas; and Tenneco Chemicals, Inc. in Pasadena, Texas.

Together, these plants account for 25% of present domestic PVC capacity. All of them were started during the past nine months.

All were designed specifically for computer control – a strategy that offers increases of 30% to 40% in throughput per unit of capital cost when compared with manual control.

And all of them can meet the Occupational Safety and Health Administration's (Osha) new limits on the exposure of workers to vinyl chloride monomer (VCM), the major raw material used in making PVC.

To date, no manually controlled PVC plant has been able to comply with Osha's requirements.

The design and implementation of computer control at the three plants was handled by the Taylor Instrument Process Control Division of Sybron Corp. in Rochester, N.Y.

J. Patrick Kennedy, a systems consultant at Taylor's office here, said the manufacture of PVC provides an excellent example of the advantages computer control can bring to a batch process: increased throughput; closer control of the process; major gains in safety; and, often, the opportunity to use larger, more efficient processing equipment.

PVC is made by the polymerization of VCM. In this reaction, molecules of VCM join to form long, chain-like molecules – polymers – of PVC.

In a typical manufacturing cycle, a reactor is loaded with VCM, water, a catalyst and certain additives. The vessel then is heated with steam until the polymerization – which produces considerable heat – is running at a selected temperature.

After that, the reactor must be cooled with water until the polymerization is finished.

Then the reactor is cooled down, unreacted VCM is vented to a recovery unit and the PVC product is removed for drying and storage.

This polymerization process is extremely sensitive to temperature. There are several grades of PVC plastic, and very small temperature differences determine which type is produced.

Cycle Time Cut

Under manual control, a polymerization cycle might take about 14 hours. Computer control can cut this time to about eight hours, Kennedy said. It does this by several means.

First, it takes dead time out of the process by making certain that the reactor and its associated equipment are never standing idle, waiting for an operator to do something. Secondly, it both optimizes and hastens the heat-up and cool-down phases of the process. Thirdly, it allows

(Continued on Page 40)

User Places Blame on Systems House For Problems With Nova Installation

By Mal Stiefel
Special to Computerworld

TULSA, Okla. – Wholesaler J.C. Hamilton Co. has gotten little but grief from its $70,000 investment and its two-year struggle to wring some benefit from its in-house Data General Corp. Nova 1200 system, according to company president J.C. Hamilton Jr.

He placed the blame not with the hardware, but with the systems house that put the installation together.

The hardware and software supplier, Computer Sales and Service, went bankrupt and its owner moved to Dallas, leaving the firm and another company in the Tulsa area with undocumented programs written in a "unique language" that couldn't be understood by any outside programmer or by the users themselves, Hamilton said.

Parallel Runs

Applications, including purchasing, inventory, accounts receivable and accounts payable, were run in parallel with a manual system for the entire lifetime of the system, because the user had "little confidence" in the validity of the programs or the computer-stored data base.

System response time to transactions entered from the four CRTs tied to the computer was over 10 seconds.

The systems house (when they were still in business) told Hamilton program changes to reduce the response time would cost over $10,000.

The hardware has been maintained by multiple vendors: Data General for the computer, CRTs and Teletype, Centronix Data Computer Corp. for the printer; Iomec, Inc. for the disk drives.

The firm was satisfied with the hardware performance although it had a strong preference for a single local maintenance source.

Considered a System/3

The company considered an IBM System/3 in 1973 before deciding on the Nova. It didn't like the $5,000 System/3 price tag, and it wanted an interactive system, rather than a card-oriented batch system.

Now the company has reassessed its needs. This time, IBM has offered the System/32, although the quoted price is still around $5,000.

But Goes to DEC

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Uninsured System Stolen From College

By John Hebert
Of the CW Staff

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There was no extra security in the physics laboratory which housed the equipment because both the building and the room had locks on the doors, according to Lt. Greg Falkman of Martin Security.

The crime occurred between the hours of 10 p.m., when the building was locked for the night, and 8 a.m., when the loss was discovered, Falkman said.

But the $10,000 to $20,000 worth of equipment was probably taken before 1 a.m. – the time when Martin Security makes its rounds, he said.

Knew What They Were Doing

The thief or thieves "seemed to know what they were doing," because the electrical cables were cut in such a way as to leave a lot of wire attached to the equipment, he said.

And other items in the room, such as the system's user manual and a teletypewriter, were undisturbed, Falkman added.

The system was donated to the college, where it was used for research purposes, only three or four months before it was stolen. Students and staff were still learning how to use it, he said.

Noting that the system had not been recovered, Falkman said he believes the college now insures all valuable equipment.

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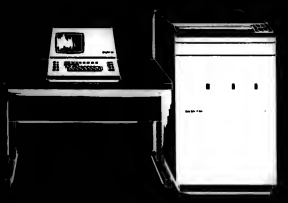

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Operators check control-room instruments at Georgia Pacific Corp.'s PVC plant in Plaquemine, La.

In Plastics Plants

Minis Reduce Risks to Workers

SAN LEANDRO, Calif. — Minicomputers are now being used to help reduce risks to employees in the process of making polyvinyl chloride (PVC), a plastic widely used in pipe, pipe fittings and packaging.

Varian Data Machines Series 620 minicomputers are controlling chemical reactors at three large new plants that manufacture PVC.

The three plants are operated by Georgia Pacific Corp. in Plaquemine, La.; Shintech, Inc. in Freeport, Texas, and Tenneco Chemicals, Inc. in Pasadena, Texas.

Together, these plants account for 25% of present domestic PVC capacity. All of them were started during the past nine months.

All were designed specifically for computer control — a strategy that offers increases of 30% to 40% in throughput per unit of capital cost when compared with manual control.

And all of them can meet the Occupational Safety and Health Administration's (OSha) new limits on the exposure of workers to vinyl chloride monomer (VCM), the major raw material used in making PVC.

To date, no manually controlled PVC plant has been able to comply with Osha's requirements.

The design and implementation of computer control at the three plants was handled by the Taylor Instrument Process Control Division of Sybron Corp. in Rochester, N.Y.

J. Patrick Kennedy, a systems consultant at Taylor's office here, said the manufacture of PVC provides an excellent example of the advantages computer control can bring to a batch process: increased throughput, closer control of the process, major gains in safety, and, often, the opportunity to use larger, more efficient processing equipment.

PVC is made by the polymerization of VCM. In this reaction, molecules of VCM join to form long, chain-like molecules — polymers — of PVC.

In a typical manufacturing cycle, a reactor is loaded with VCM, water, a catalyst and certain additives. The vessel then is heated with steam until the polymerization — which produces considerable heat — is running at a selected temperature.

After that, the reactor must be cooled with water until the polymerization is finished.

Then the reactor is cooled down, unreacted VCM is vented to a recovery unit and the PVC product is removed for drying and storage.

This polymerization process is extremely sensitive to temperature. There are several grades of PVC plastic, and very small temperature differences determine which type is produced.

Cycle Time Cut

Under manual control, a polymerization cycle might take about 14 hours. Computer control can cut this time to about eight hours, Kennedy said. It does this by several means.

First, it takes dead time out of the process by making certain that the reactor and its associated equipment are never standing idle, waiting for an operator to do something. Secondly, it both optimizes and hastens the heat-up and cool-down phases of the process. Thirdly, it allows

(Continued on Page 40)

User Places Blame on Systems House For Problems With Nova Installation

By Mal Stiefel
Special to Computerworld

TULSA, Okla. — Wholesaler J.C. Hamilton Co. has gotten little but grief from its $70,000 investment and its two-year struggle to wring some benefit from its in-house Data General Corp. Nova 1200 system, according to company president J.C. Hamilton Jr.

He placed the blame not with the hardware, but with the systems house that put the installation together.

The hardware and software supplier, Computer Sales and Service, went bankrupt and its owner moved to Dallas, leaving the firm and another company in the Tulsa area with undocumented programs written in a "unique language" that couldn't be understood by any outside programmer or by the users themselves, Hamilton said.

Parallel Runs

Applications, including purchasing, inventory, accounts receivable and accounts payable, were run in parallel with a manual system for the entire lifetime of the system, because the user had "little confidence" in the validity of the programs or the computer-stored data base.

System response time to transactions entered from the four CRTs tied to the computer was over 10 seconds.

The systems house (when they were still in business) told Hamilton program changes to reduce the response time would cost over $10,000.

The hardware has been maintained by multiple vendors. Data General for the computer, CRTs and Teletype Centronix Data Computer Corp. for the printer, Iomec, Inc. for the disk drives.

The firm was satisfied with the hardware performance although it had a strong preference for a single local maintenance source.

Considered a System/3

The company considered an IBM System/3 in 1973 before deciding on the Nova. It didn't like the $5,000 System/3 price tag, and it wanted an interactive system, rather than a card-oriented batch system.

Now the company has reassessed its needs. This time, IBM has offered the System/32, although the quoted price is still around $5,000.

But Goes to DEC

But the company has, in fact, installed a Digital Equipment Corp. system in its Amarillo, Texas office, a similar purchase is planned for the Tulsa operation to replace the existing system.

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Minis Help Reduce Worker Risks in Plastics Plants

(Continued from Page 39)

simultaneous performance of steps that must be done serially in a manually controlled plant.

The charging of a PVC reactor involves a large number of steps and the operation of as many as 50 valves and other devices – notably the opening and closing of valves, Kennedy said.

When a few seconds are trimmed from the operation of each device and when sequential make-ready steps that take an hour are replaced by a computer-controlled operation that takes a few minutes, the saving of time can be substantial.

This can be translated readily into dollars. Kennedy cited an example of a plant that makes 400,000 ton/year of PVC, buying the required VCM for 12 cent/lb and selling the plastic for 26 cent/lb.

If such a plant had a cycle time of 14 hours under manual control, every minute trimmed from the cycle time would yield about $125,000/year in increased revenues simply by boosting throughput.

Contributes to Safety

The computer system's ability to check and compare information contributes greatly to the safety of both the product and the plant's operating personnel.

Manually controlled reactors have suffered a variety of accidents: additives have been omitted, so that batches were ruined; valves have opened prematurely, dumping the product; and reactors have exploded after receiving a double charge of catalyst.

In a computer-controlled plant, a large number of data checks virtually precludes such occurrences, Kennedy said.

For example, when a reactor is being charged, the computer in a Taylor PVC system determines how much reactant has flowed by monitoring four quantities: revolutions of a flow meter, revolutions of the pump that delivers the reactant, total running time of the pump and the change in the liquid level in the reactant tank.

Unless all of these quantities agree, the computer initiates an emergency procedure requiring intervention by an operator.

The value of computer control in allowing advanced processing equipment to be used is illustrated by the recent advent of large reactors in PVC manufacture.

The reactors stand about six stories tall and hold 30,000 to 50,000 gallons. In manually controlled plants, each reactor's capacity is between 2,000 and 7,000 gallons.

Able to Meet Standards

This combination of computer control and large reactor size – along with new methods of fabricating, coating and cleaning the reactors – will enable the owners of automated PVC plants to meet new Osha standards that will limit the exposure of workers to VCM vapors.

The regulations require that the average level of VCM in the air a worker breathes during an eight-hour shift must not exceed one part per million and that peak levels of VCM must not exceed five parts per million.

Plant operators are exposed to VCM from two sources. Valves and fittings may allow small amounts of monomer to leak continuously into the plant atmosphere. And larger amounts of vapor may be released when a reactor is opened for manual cleaning.

In older PVC plants, average monomer concentrations in the ambient air may be as high as 50 parts per million, and local concentrations during reactor cleaning can be much greater.

Owners of such plants doubt that they can meet the Osha requirements, which are scheduled to become effective on April 1. The Society of the Plastics Industry tried unsuccessfully to persuade the Supreme Court to extend the deadline.

In the new large reactor plants, VCM vapor is well controlled, Kennedy said. There are fewer sources of leakage, since far less plumbing is needed for one 40,000-gallon reactor than for ten 4,000-gallon units.

And the large vessels are opened for cleaning less often. Reactors developed by Shen-etsu Chemical Industry Co. may need manual cleaning only once a year, he said.

This low cleaning frequency is attained through the use of a proprietary coating that is sprayed onto the reactor's interior surfaces before each processing run.

Equally important is the fact that an automated plant has fewer workers to expose to VCM, Kennedy said.

Shintech's plant, for example, has only about 45 operators. An older plant having roughly the same PVC capacity requires more than 160 operators.

The capital cost of such a system is about $250,000, corresponding to a leasing cost of about $8/hour for 24 hour/day, Kennedy said.

This is about half the cost of one plant operator, he said. Taking all overhead items and fringe benefits into account, a typical chemical-plant operator now costs his employer about $17/hour, Kennedy added.

Controls Measuring Devices

Mini System Hastens Lab Testing of Air Conditioners

YORK, Pa. – By controlling some of its numerous analog measuring devices with a minicomputer system, the York Division of Borg-Warner Corp. here has slashed the time required to acquire and process certain kinds of test data in its engineering laboratory.

The manufacturer of air-conditioning, refrigeration and heating and ventilating systems has also realized substantial savings in computer programming time and broadened its computerized testing applications.

The minicomputers include a Hewlett-Packard (HP) 9600 scientific measurement and control system, used for data acquisition and conversion, and an HP 3000 Mini Datacenter, used for component and system design, rating, test data analysis, mathematical/statistical analysis and program development.

Prior to installing the HP computers, all measurements of data crucial to air-conditioning research were read manually by technicians, then converted to punched cards for computer input.

Now the HP 9600, located in York's engineering test laboratory, has the capability of scanning up to 400 analog input channels from a variety of transducers. In addition, it converts the signals to a digital format for processing in the HP 3000 for some testing requirements.

Besides relieving technicians of manual data logging, the HP system processes in 1.07 hours a typical mix of test data that formerly required eight hours with the predecessor computer.

Programming man-hours with the HP 3000 have been reduced by 16%, according to the firm. Factors contributing to this improvement are on-line terminal access for program compilation and execution; a shareable subprogram library of commonly used subroutines; and HP software aids which facilitate the detection of program errors.

Data acquisition, conversion – from analog microvolt representations to digital degrees Fahrenheit, for example – and preliminary reduction are accomplished with the 9600. The HP 3000 is used for programming and further data processing. The two computers are interfaced to allow on-line transfer of programs and data.

Many variables are inherent in the basic air-conditioning cycle. Liquid refrigerant, the medium of air conditioning, flows to evaporator coils where it absorbs heat from air blown over the coils.

As a result, the refrigerant expands to a gaseous state. The vapors must then be compressed sufficiently to gain a high enough saturation pressure to allow condensing at an above-ambient temperature.

Upon discharge into a condenser, the heat is passed from the vapor to the atmosphere, thus condensing the vapor into a liquid state. Supporting the cycle are various flow controls and valves to regulate the process on demand from the air being conditioned.

A system of one variable in the design of an air-conditioning system affects the others. Hence, comprehensive testing is essential at York to increase continually the efficiency of its products.

Checks Temperatures

The program entails measuring temperatures, pressures, flow rates, electrical power and acoustic spectra of operating air-conditioning systems.

One testing procedure, for example, measures various temperature levels both outside (at the condenser coil) and inside (at the evaporator coil), plus air flows and power input.

Other critical tests involve components. For example, a compressor, which compresses vapors received from the evaporator, must be tested for capacity and power usage under a wide range of conditions.

In addition to measuring and checking the refrigerant flow rate from electrical heat input to the stand and from water flow and temperature measurements, temperature and pressure are recorded for both compressor inlet and outlet, as well as compressor speed and power consumed.

Supports Infant Cardiac Net

T/S System at Hospital Improves Patient Support

FRAMINGHAM, Mass. – More and more, hospitals are looking at computer information systems as a means of fighting increases in costs and labor and continuing high-quality medical care.

The research computer facility at Boston Children's Hospital, a long-time computer user, reassessed its information processing needs a year ago. As a result, it modified its computer operations with a minicomputer time-sharing system.

The system, according to Jon Wadleigh, Boston Children's systems manager, has already increased the computing services available at the hospital, drastically improved data base updating and retrieval times and decreased the data storage needs of dedicated minicomputers scattered throughout the hospital's research facilities.

The system is composed of a Prime Computer Model 300 with 74K bytes of MOS main memory, a disk operating system with virtual memory, floating-point hardware and a 16-line asynchronous controller. It supports a card reader, 300 line/min printer, 60M-byte moving-head disk, 9-track magnetic tape unit and four CRT terminals.

Net for Infants

The Prime 300 provides time-sharing services for a variety of hospital applications, including the Regional Infant Cardiac Program (RICP), which involves Children's and 10 other hospitals.

The RICP, a unique hospital network covering all New England states, is concerned with collecting, storing and retrieving information on infants in the six-state region who develop congenital heart diseases.

The system at Children's Hospital acts as the information center for all hospitals in the program. The data base consists of 2,800 cases, or 95% of all children born with heart disease in the New England area over the past eight years.

The data base can be accessed in a variety of ways, such as by particular heart lesions, type of effective treatment, including surgical procedures, and life expectancy rates. The diversified data retrieval methods have allowed researchers to compile statistical analyses on particular types of heart disease, correlate any common data among cases that may show a causative relationship and study a particular set of cases with common attributes.

The system handles sorts, printing, update functions and data entry. The 300's time-sharing capability has resulted in making the program more of an on-line, interactive function, Wadleigh said, and has increased response to retrieval requests from days to a few hours.

The results of the program have saved the lives of an estimated 1,000 New England babies born over the last four years and improved the survival rate from 25% to 65% for the group as a whole.

Cardiology Data Base

Computer information processing at Children's also extends to all cardiology patients seen at the hospital, plus a variety of independent research activities. The data base for cardiology patients numbers over 12,000 cases.

Data on each patient is inputted to the system by summary forms which are completed by hospital personnel in the clinic, catheterization lab, cardiology operating room and the pathology lab. This information is then encoded and processed.

Individual patient readouts supply doctors with comprehensive information about a patient, including history, diagnosis, procedures used, progress, associated surgery and a chronological list of medical events. These give doctors the most complete and current information available on which to base a diagnosis or prescribe treatment.

Mini-Controlled Signs Even Show Replays

By Ross W. Miller
Special to Computerworld

SPOKANE, Wash. – Want the time? Temperature? Game score?

Well, check your nearest automated display. Solid-state display systems by American Sign and Indicator Corp. (AS&I), located here, reach 120 million people every day with time, temperature, advertising and community messages – and many of these are minicomputer-controlled.

AS&I is the company that produced the 1,100-lightbulb message center at the American Stock Exchange and the automated reader board at Disneyland which, among other things, is capable of displaying Donald Duck, Pluto and other Disney characters.

An example of what AS&I can do is the $1 million 20-ft by 180-ft scoreboard at Riverfront Stadium in Cincinnati. The board, with 30,000 lamps and 405 miles of electric wire controlled by a minicomputer, displays statistics, game-in-progress information, pictures, shapes, words, cartoons and silhouettes synchronized to music.

The company also produced the scoreboards at Cobo Hall/Arena in Detroit, Mich., and Kansas City Hockey Scouts in Kansas City, Mo., as well as the dual scoreboard at the University of South Carolina. All three installations have full pictorial and logo capability and each is controlled by a Digital Equipment Corp. PDP-8.

Last summer, AS&I's most sophisticated scoreboard was installed at Pontiac Stadium in Michigan. Connected to two DEC PDP-11/35 minicomputers and a live video input, the scoreboard is capable of showing instant replays to the stadium crowd.

Applying the latest technology, a video signal is translated into digital format and relayed to the two minicomputers. The minis, in turn, by transmitting 4 bit/point to the board's 10,800 gas-filled, 40-watt lightbulbs, produce a 16-level grey scale on a matrix so fine the effect is that of a giant television picture.

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Data General, Dept. N4, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario. Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.

LEGEND

1. All computer figures are taken from projections of International Data Corporation, the world's largest EDP market research firm.
2. State-by-state numbers are number of computer systems in state.
3. Percentage figures represent percent of total U.S. computer systems installed in state, measured by value.
4. States in lighter shading are ten largest measured by value of computer systems installed. States in darker shading, and Washington, D.C. are next biggest.
5. Cities shown are 1976 Computer Caravan sites. Inner circles are 100-mile radius from city. Outer circles (where shown) are 200-mile radius from city.

Going your way is our way.

Computer Caravan/76 brings a national computer conference to key computer-using states across the country.

Measured by value of computer systms installed, the ten largest states in the U.S. (lighter shading on map) account for more than 60% of all computer systems in the United States. Adding the next biggest areas - 7 states and the District of Columbia (darker shading on map) - we get to more than 75% of all the U.S. Computer systems, measured by value. And it's these key states in the computer world which will be host to - or nearby - one or more of the nine cities in the Computer Caravan / 76 - the travelling computer users' forum and exhibition sponsored by *Computerworld*.

To computer professionals, this means a unique opportunity to see a national computer show without leaving the office for a week and travelling across the country. It's a chance to keep up on the latest information in our user-to-user forums and on the latest products and services in our complete exhibition.

And thousands of computer professionals will take advantage of this opportunity as the Caravan moves across the country. The '76 Caravan can expect attendance of over 30,000 computer professionals, and unlike any other computer show, significant numbers of attendees will come from each of 15 states and the District of Columbia -- representing 65% of all U.S. computer systems installed. That's true national coverage.

As a marketer of computer products and services, the Computer Caravan offers you a unique opportunity to meet the professionals who run our country's computer installations in a one-to-one, business oriented atmosphere. Because there are 27 different show days, no one Caravan day is too crowded to give you the opportunity to present your products or services in detail -either on our exhibit floor, or in your own product seminar. And the 1976 Caravan offers several innovations which can make it more suitable to your individual marketing problems:

1. For companies with limited marketing areas, there are 3 regional tours (East, Midwest or West) to choose from - or our new "Major City Tour" (New York, Chicago and Los Angeles). You'll be covering only part of the total market, but that may be all you want - and costs are much less.
2. For companies specializing in the OEM market, there is our new companion show, COMPDESIGN 76. Sponsored by *Computer Design* magazine, this show will appear in the same halls with the Computer Caravan in five key OEM markets: Boston, New York, Chicago, San Francisco, and Los Angeles. It will attract thousands of key computer designers, and will also be open to Caravan attendees in those cities.
3. Data communications marketers can take advantage of our DATACOMM 76 add-on, which gives you a spot in the national data communications show sponsored by *The Data Communications User* magazine.

There's a lot more we'd like to tell you about Computer Caravan/ 76, but if you're interested in exhibiting, time is short. So send in the coupon right away.

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COMPUTER INDUSTRY

CI Notes

HIS, CII Talks Continue

PARIS – Negotiations are continuing on the contract for the merger of Honeywell-Bull and Compagnie Internationale pour l'Informatique (CII), a Honeywell Information Systems (HIS) spokesman said.

The French government is expected to grant contracts and subsidies valued at about $1.35 billion over the next four years, he said.

The French government has agreed to cover CII's losses for this year and for the first two months of next year, estimated at $175 million.

The spokesman explained the current negotiations are being conducted by lawyers, which could indicate agreement by high-level management has been reached on most terms.

DCC Injunction Stayed

FAIRFIELD, N.J. – Digital Computer Controls, Inc. (DCC) has filed an appeal and posted bond of $500,000, thus effecting a stay on the injunction handed down by the Delaware Chancery Court (CW, Nov. 19).

The appeal will be heard by the Supreme Court of Delaware.

DCC said it will continue to manufacture and ship its full product line, including the D-116 involved in the suit, pending a decision on the appeal.

The injunction barred DCC from copying and using Data General Corp.'s (DG) proprietary trade secrets contained in the logic design for DG's Nova 1200s for any purpose other than maintenance or as permitted by DG proprietary legends and from using DG's Nova 1200 and DCC D-116 logic drawings containing DG trade secrets for the purpose of manufacturing minis substantially identical to the Nova 1200.

Supershorts

Advanced Computer Techniques Corp. and Ekonomski Biro, a Yugoslav management and business consulting firm, have agreed in principle to establish a joint company to provide DP consulting services to companies in Yugoslavia and other countries.

– – –

Sirvess, Inc. has agreed to perform third-party maintenance on Data Printer Corp. line printers.

– – –

Computer Sciences Corp. has formed an Applied Technology Division in its systems group which will incorporate functions of the Field Services Division while adding more capabilities for engineering and operating simulation, aerospace and other high-technology systems for clients in industry and the Federal government.

As Batch Jobs Decline

Survey Finds Remote Batch, T/S to Grow

By Molly Upton
Of the CW Staff

NEW YORK – DP services firms of all sizes expect remote batch and time-sharing services to account for a larger percentage of their revenues in 1977 than in 1974 and expect batch to be a relatively less important source of revenues.

These are some of the results of the "Ninth Annual Industry Report" to the Association of Data Processing Service Organizations (Adapso) prepared by Quantum Science Corp.

The report analyzes responses from 130 firms in the computer services industry.

Smaller firms' profits held up relatively better than did those of the larger services firms during 1974 compared with 1973, the study indicated.

The most significant problem was the impact from service bureau competitors and/or new technology, followed by design and development of a new product, the Adapso report found.

Forecasting sources of revenues for 1977, the small firms, under $500,000 in annual revenues, indicated total revenues from batch would drop from 79% to 55% in 1974.

Firms in the category of $500,000 to $2 million in revenues foresee batch revenues dropping from 51% to 35% of their gross in 1977.

Firms from $2 million to $10 million see batch revenues accounting for 16% of their total in 1974, instead of the 24% in 1977, while for companies over $10 million, the drop will be from 18% to 15%, according to the study.

Remote batch and time-sharing services will show the largest gains among the smaller firms, rising from 6% to 20% in the smallest size firms and 15% to 27% in those with revenues between $500,000 and $2 million.

In firms between $2 million and $10 million, the increase in revenues from remote batch and time sharing will be from 21% to 28% in 1977, and for the largest firms from 18% to 24%.

Services Estimates Vary

Expectancy of revenue contributions from software services varies according to the size of the respondents. For instance, the smallest firms plan an increase in revenues from software services from 4% to 7%, while all other categories see a decrease in the percentage of total revenues.

Software products revenues are seen increasing by the $500,000 to $2 million firms and static by those over $10 million, while the rest forecast a decline.

Looking at profitability, the survey found the small firms' profits increased 112% between 1973 and 1974, while those in the $500,000 to $2 million category showed a rise of 4%.

However, in all other categories, the average profit declined.

Among firms in the $2 million to $10 million range, the average change was a 10% decline, compared with a 16% decline among those in the $10 million to $100 million category.

The average change overall among the 44 respondents to this question was a drop of 13%.

In ranking the competition, the category of other DP service firms retained its 1974 survey rank of first; however, minicomputers and small business systems, added to the questionnaire this year, soared to the No. 2 position.

Banks held third position as before. Corporations with in-house computers dropped to fourth position from the previous rank of second.

Government agencies outranked "others" for fifth place. Last year government agencies were last among possible competitors.

In ranking the most significant problems, companies differed in their assessment of the impact according to their sizes.

For instance, overall No. 1 was impact from service bureau competitors and/or new technology, as voted by the two smaller categories. However, the next to largest firms saw design and development of a new product as most significant, whereas the largest firms were primarily concerned with technical personnel acquisition and retention.

Overall, the second problem was design and development of a new product, followed by marketing personnel acquisition and retention, then technical personnel.

Ranking No. 5 was working capital and control of cash flow, followed by marketing of a new product, government regula-

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Add-On Business Turns Up Again With FS Delay, Uneasy Economy

By Molly Upton
Of the CW Staff

The 370 add-on memory business has improved over a year ago with a noticeable upward trend in the last six months, most makers contacted in a survey agreed.

And there's a lot of life in the 360 add-on market, they said.

In the 370 area, many attributed much of the growth to the word from IBM that it is postponing announcement of what was known as its Future Systems (FS) series.

Also, some cited the recessionary economy, which they said has prompted users to make do with their existing hardware rather than upgrade.

Bill Jordan, vice-president and general manager of Intel Corp.'s Memory Systems Division, said "business has been real good for us in the last six months."

Part of the rise in sales is a result of Intel's efforts to sell directly to the end user, he said, which began last spring.

Intel's add-on memory business is "substantially better than a year ago," he said, observing there has been a general increase throughout the year.

The 370 models for which add-on memory demand is currently greatest are the 135 and the 158, he said. The 158 add-on averages about 1M byte and the 135 about 250K bytes, he said.

Intel makes add-ons for the 135, 145 and 158 and will soon have one for the 168, he said. All products are semiconductor.

Jordan mentioned the recession as also partly responsible for the upswing, noting that in the economic crunch users tend to look to the independents.

Wayne R. Brumm, product manager of systems equipment operations at EMM Computer Products, said, "We're very bullish on 370 add-ons."

EMM's business in add-on memory for 155s is 50% larger than it was a year ago, he said.

Brumm cited as reasons for the upturn in its 155 business the upturn in the economy and the FS delay which nurtured the trend by users to expand their systems above the manufacturer's limit.

EMM offers an enhancement product for the 155 with more than 2M bytes.

Indicating the popularity of using enhancements, he said between now and the end of next year he expects the average memory capacity of the 155 to grow to 1.75M bytes, which means nearly 50% of the units will have over 2M bytes.

"And that market is only available to those plug-compatible makers who offer memory enhancements," he observed.

"Enhancement only comes about after a product has matured," he said, and after users have added memory to the manufacturer's limits.

Accelerating Trend

Brumm cited an accelerating trend in the firm's memory business, saying the

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Uneasy Economy, FS Delay Prove Add-On Mart Boon

(Continued from Page 45)

third quarter was 20% better than the first half, and the fourth quarter is expected to be 20% better than the third. "It seems many customers are making financial commitments for additional memory to get them in this year," Brumm observed.

The firm has about 60M bytes of memory on 155s installed, he said, and is entering the 145 and 158 market in earnest.

Although EMM has offered memory on the 145 before, it has not stressed this product as it was waiting until it had its own semiconductor capability for both the 145 and 158 product, he said.

The 145 uses 1K chips while the 158 uses 4K chips, he said.

Brumm said he's anticipating placing over 50M bytes of memory for 158s in 1976.

Of the 145 add-on business for the industry next year, he said EMM expects to grab 20%, with EMM's portion growing from about eight units currently to over 75 in 1976.

The firm also plans to enter the 135 market next year, he added.

Overall, Brumm said he expects the 370 add-on market for EMM to become within two years 2-1/2 times the 360 market in terms of bytes.

Contrary to Jordan, who cited the recession as helping business, Brumm said business a year ago was admittedly weak since there was a downturn in the economy.

Business Much Better at AMS

At Advanced Memory Systems, Inc. (AMS), business is much better, according to Dick Andreini, vice-president of systems marketing.

The firm makes semi memories for the 135, 145, 155, 165 and 158 and is soon coming out with one for the 168, he said.

It also offers processor speed-up units (PSU) for the 155 and 165. The 155 PSU has been very strong for a year and a half, he said.

Andreini said the key spots for next year are the 135 and the 158, which are very strong, and he has good expectations for the 168 also.

In terms of units, demand is hottest for the 135. Demand is fairly even across the board, Andreini said.

The add-on business has been heading upward in the last six months, he said, with demand running about 15% to 20% over the previous year, he added.

Demand for add-ons for the 155 and 165 was "pretty dormant" through most of 1974, he said, until it became evident the FS would be postponed. Business in this sector has picked up in the last six months.

At Cambridge Memories, Inc. (CMI), a firm that earns 80% of its revenues from sales of add-ons for the 145, 158, 155 and 165 and only 20% from 360 add-ons, salesmen are gearing up to meet the needs of the 135 user with an add-on memory that will be available in January.

"We have a backlog there and estimate that the 135 market will be a very active one.

Don Ventura, CMI vice-president of marketing, added, "Now that the air has cleared on FS, we are seeing a renewal of decisions on CPUs, which is indicative that the memory business should pick up."

The most significant trend CMI has observed has been a change in the mix of lease to purchase arrangements – many more DP managers have chosen to sign short-term leases as opposed to purchases, he said.

At Ampex Corp., demand for the 155 and 165 core add-on is about the same as last year, said Al Horowitz, product manager.

However, he remarked, there is greater activity in the 360 area. The Extended Core Memories for the 50, 65 and 75 are starting to pick up and business in the add-on mainframe memory has increased over that of a year ago, he said.

The upward trend in 360 add-on demand has been especially noticeable in the last six months, he said.

Demand is keenest for memory for the 65, Horowitz added.

Fabritek Corp.'s Jerry Larsen, vice-president of marketing, reported the firm's 360 business is as good as last year's in terms of units, but is somewhat down in revenue because of price erosion in the market.

The firm initiated its own direct marketing program a year ago, and the campaign has picked up dramatically, he said.

Add-ons for the 65 and the 30 are the two most popular items at the moment, Larsen said.

At AMS, Andreini said business has been surprisingly good in the 360 sector for the last six or eight months. Most notable demand has been for the 65 and 50, he said.

Batch to Ebb as T/S, Remote Batch Grow

(Continued from Page 45)

tions and other. One hundred firms answered this question in the survey.

In the area of future applications offerings, whereas there was a rising percentage of the number of smaller firms offering planning/modeling, fewer of the larger firms plan to offer this in 1977 than in 1974.

The percentage of smaller firms planning to offer data base management jumps from 16.9% in 1974 to 27.3% in 1977, but remains relatively stable among the larger firms: 56.7% compared with 57.1% in 1977.

The report is available for $150 from Quantum Science Corp., 245 Park Ave., 10017.

Austrian HP Fined For Export Violation

WASHINGTON, D.C. – The U.S. Department of Commerce imposed a $6,000 fine and a six-month probation period on Hewlett-Packard GmbH (HP) in Vienna, Austria, for unauthorized reexportation of two computer systems and peripherals to Czechoslovakia.

The penalty was imposed after voluntary disclosure by HP, which indicated measures have been taken to prevent such violations from occurring again.

The licensing specialist for HP indicated he thought certain demonstration licenses would provide temporary coverage until U.S. export permission was obtained.

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But Has No Plans to Sell Tape

ITC Expects Improved Quality With In-House Media

By Molly Upton
Of the CW Staff

SUNNYVALE, Calif. – Media supplier Information Terminals Corp. (ITC) is becoming a media maker. Progress is proceeding on the construction of a 37,400 sq ft plant for production of magnetic tape used in its media products.

The move is a natural one, President Reid Anderson said, observing that in-house manufacture will enable the firm to control the quality of its products more and also provide cost benefits.

"We believe we can make a better quality, more consistent product," he said. The firm supplies cassettes and floppy diskettes.

Costs of tape have more than doubled in the past year, Anderson said.

Currently the firm receives shipments of raw tape, which it then slits and coats for various products such as magnetic cards, cassettes and floppy disk drives. "We reject a lot of material," he said.

Currently ITC has one supplier with whom it has worked on quality, and ITC will continue to receive shipments as a second source, he said.

The building will allow for expansion in the production of cassettes and floppies, he said. Construction is expected to be completed in February, and Anderson expects the tape production line to be operational about August.

No Plans to Sell Media

The firm has no plans to sell its media, but rather intends to consume all of the yield, he said.

ITC is not thinking of going into the magnetic tape marketplace, he said.

The cassette market is not as cost-competitive as the magnetic tape area, probably because of the complex equipment included in the cartridge, he said.

Anderson said this past fiscal year ended in June was a poor one for the firm: it grew only 60%. During the previous years it has more than doubled its growth, he said.

For fiscal 1976 he expects to almost double; "we could get close," he said, adding that it is "very hard to double every year." Last year the firm's revenues were over $10 million, he said.

ITC, which is 6-1/2 years old, has been profitable for the past three fiscal years, he added.

ITC has come out lately with media for its floppy disk that is "as good or better than IBM's," Anderson said.

CW Photo by R. Frank

Reid Anderson

OEM prices of floppy disks have been going down, but Anderson said he does not expect the prices to drop too much further, especially if customers are fussy and specify various levels of certification.

Currently diskettes in large-volume orders are selling for under $4 apiece, he said.

ITC supplies a cartridge for the 3M Co. drive and is waiting to check whether its license with 3M covers the smaller version 3M developed with Hewlett-Packard Co. (HP) for use in HP's new terminal, he said.

Although the floppy looks like a simple product to manufacture, it's not, Anderson said.

Carl Holder, product manager of marketing, said there are a lot of refinements to even the packaging of the diskette that make a difference.

Wyly to Sell Gulf, UCC Banking Division

DALLAS – Wyly Corp. has been active in negotiations to sell its Gulf Insurance Co. subsidiary and its banking division and has reached a preliminary agreement with Walter Haefner Holding AG that would allow Haefner to make an additional investment in Wyly's Data Transmission Co. (Datran) subsidiary.

Wyly said it expects to complete the sale of Gulf to Fuqua Industries, Inc. within two months.

The sale is subject to approval by directors of both firms, certain creditors of Wyly and appropriate regulatory agencies.

The sale should eliminate $30 million of Wyly's highest interest debt, the firm said. Wyly's nine-month report included a $37 million loss for Gulf, including the extraordinary loss resulting from the sale.

Wyly's subsidiary, University Computing Co. (UCC), has agreed in principle to sell its banking division to Boeing Computer Services, Inc. This sale is subject to financial audit and approval by certain Wyly creditors and directors of both companies.

Under terms of the agreement with Haefner, Haefner will increase its current investment in Datran to $47 million.

Haefner will receive an option to acquire an additional $20 million of Datran 8% subordinated convertible debentures and will subscribe to $7 million of these early next year, according to the agreement terms.

Haefner will also receive additional warrants to purchase one million shares of Wyly common. The Swiss holding company already has rights to 3 million Wyly Corp. warrants.

Haefner will assume a guarantee Wyly had made to one of Datran's vendors, thereby releasing $2.4 million of cash collateral to Wyly Corp.

The latest agreement between the two firms is subject to approval by the Federal Communications Commission, Wyly shareholders and others.

Cost Reductions Mark Mini Industry, DEC Head Says

By Nancy French
Of the CW Staff

NEW CARROLLTON, Md. – If the automobile industry had the same cost reductions as the minicomputer industry, a car that cost $4,000 in 1959 would cost $112 today, Kenneth Olsen, president of Digital Equipment Corp., told a gathering of government and industry executives here recently.

A 4K DEC PDP-8 that sold for $16,000 in 1965, for example, today sells for only $2,000.

Estimates show that some two million U.S.-manufactured microprocessors and 300,000 minicomputers will be installed throughout the world by 1976, he said.

While the number of installed large computers is growing at a snail's pace compared with minis, "the dollars spent on large systems still continue to grow dramatically," he said. Olsen showed a graph indicating the installed base of large systems will be worth nearly $60 billion in 1976, compared with only about $8 billion for minicomputers and less than $1 billion for microprocessors.

However, the dollars spent on microprocessors and minicomputers systems "give little indication of the influence these devices will have on our modern society. We cannot even estimate what their applications will be yet," he said.

Olsen cited three characteristics of the minicomputer that account for their importance: "Because of their size and price they allow interactive computing," he said. Second, "they allow distributed processing and third, they allow easy communication and the generation of networks."

Minis Enjoyable

People enjoy working with a minicomputer because the machine never gets tired, never gets bored and is always interested in people. Work becomes a game, he said.

This he compared with using a big expensive system, kept behind glass walls, that "required" people to keypunch data, manually verify it and then deliver it to the processor. Some time later the user received his results, which often showed great mistakes had been made.

"It took great discipline for many people to use these systems and the efficiency of operators and programmers was poor," he said, speaking in the past tense to indicate his belief that this condition no longer exists.

Before computers came along, data bases were kept in many parts of an organization in whatever way seemed natural. The output of these data bases was collected or interchanged periodically as needed.

When computers came along, they were very big and very expensive and even the largest companies could afford only one. There was a tendency to put everything on one computer, and data base management generated much overhead, he said.

"There was also a dream called 'management information systems' in which there would be one data base which would contain all the organization's information; management simply would ask for anything, presented the way it wanted, and it would miraculously come out of the machine and decisions would be easy."

But the old way of keeping many data bases arranged in a natural way did have advantages, and "smaller, cheaper computers will give users the opportunity to separate out their data bases in a natural way and communicate only as needed," he said.

Each group has control over its own information, and avoiding the massive, bureaucratic organization that builds up around a central computer can be more efficient, he said.

Networks Practical

Small computers are exciting because they make many networks practical. In networks of many terminals, such as an airline reservation system, minicomputers are used for preprocessing or message switching to save on phone line costs.

However, "networks of computers" – rather than terminals – "might be more important," Olsen said.

As computers are located in many places within an organization, networks tie them together for communication. The communication link may be a weekly report sent by mail or high-speed transmission lines in continuous use, he explained.

Minicomputer networks can also be used to share resources such as in a laboratory environment, Olsen explained.

For example, a laboratory with many small computers can be tied to one large computer with large amounts of storage and expensive peripherals. The small computers in the laboratory would have their own terminals and analog-to-digital converters and would be able to directly control equipment and experiments.

The large computer would hold the programs, store data and unload and load the small laboratory machine quickly and efficiently. In this way, people can have small and inexpensive machines to use freely throughout an organization and still have much of the power of a large machine, he said.

Networks of minicomputers can also be tied together to make powerful large computers with the advantage that one can start small and, as the problem grows and is understood, modules can be added, he explained.

This allows the user to build redundancy into the system so a single failure will not stop it. Data bases can be distributed within the system without the cost and complexity of an elaborate data management system.

Further, specialized machines can be developed and debugged without tying up the rest of the system, and parts of the system can be separated from other parts to achieve security, he explained.

Interdesign Creates Fund To Help Nonprofit Groups

SUNNYVALE, Calif. – Interdesign, Inc. has created the James V. Ball Fund to make the services and products of the company available at no charge to selected nonprofit organizations.

The fund will provide for the integration and production of Monochip custom integrated circuits for applications such as medical electronics, research and education.

Ball is vice-president of research and development at the firm.

Transaction Pricing for Software Seen on Increase

By a CW Staff Writer

PHILADELPHIA – The use of transaction pricing for software will increase considerably by 1985, according to Informatics, Inc. President Walter F. Bauer.

Surveying several issues which could affect the DP scene in 1985, Bauer observed DPers should weigh the issues and do their part to optimize the future shape of the industry, he told a users meeting here.

Among the "matches" being played in the industry today are: the government vs. IBM, IBM vs. the peripheral equipment manufacturers, independent software and services companies vs. the mainframe companies, transaction vs. facilities pricing and free-standing minicomputer vs. large-scale communication-based computers, he said.

Bauer said the concept of transaction pricing appeals to both the user and supplier. Under transaction pricing, a user would be charged for a Cobol compiler, for example, on the number of Cobol statements produced.

"The appeal of transaction pricing is in its more direct relation to customer costs, allowing the customer to better understand the correlation of the DP costs to his other business costs," he observed.

"The supplier likes the arrangement because, in relating the price to value received, he hopes to get a higher price," he said.

U.S. vs. IBM Case

"The viability, if not the very existence, of about 80% of the firms in the DP industry depends on what happens" in the case of U.S. vs. IBM, he said.

One important question, he suggested, is "Will the case be decided on its technical merits or will the decision gravitate to the intangible area of the future of competition in the DP industry?"

Another is the degree to which today's growing antibig-business sentiment will offset the fine public relations image IBM has developed over the years, he said.

If there should be a consent degree, the wording in it will be crucial, he said, for if the decree doesn't consider software and services, IBM could well become the overwhelming supplier of software and services in 1985, he said.

A "cavalier approach" to decimating IBM could easily result in less competition than now exists, Bauer observed.

The match of IBM vs. the peripherals makers "may not make it into the finals of the tournament unless the government beats IBM in the semifinals," he said.

The U.S. vs. IBM case can be called "principally a lawsuit to determine whether there will be a plug-compatible peripheral equipment business in the future," he said.

The chances that the typical peripheral equipment company can survive if it is dependent solely on the nonplug-compatible marketplace is in most cases no greater than 25%, according to Bauer.

Software Houses vs. Mainframes

In the match between the independent software and service company vs. the mainframe company, the participants are "reluctant to square off at each other.

"In fact, most of them probably don't yet recognize the other as a serious or qualified opponent," Bauer said.

Although "the larger mainframe companies are offering certain items of software, most of these are not yet in strong competition with the software products made by the better software companies," he said.

An exception is in the data base area where IBM has IMS.

Although Honeywell and Univac and other mainframe contractors except Control Data Corp. have shown little interest in data services, "is there anyone among us who believes the day will not come when all mainframe companies show such an interest?" he asked.

Bauer didn't venture to guess the outcome of the minis vs. communications-based central processors, but reiterated the arguments of each side.

Contracts

The Kennedy Co. has been awarded a contract from the Systems Technology Division of Fairchild Camera & Instrument for Model 9000 tape transports to be used with automated testing equipment.

GTE Sylvania has received a $1.6 million contract from the U.S. Army for continued work on the Army's computer-controlled processing, storage and retrieval system.

Softech has been awarded a contract from the U.S. Department of Labor's Bureau of Labor Statistics for a data base system to be used in conducting surveys of economic business activity.

Informatics, Inc. has been awarded a contract grant by the National Science Foundation, Office of Science Information Service, for a study defining the development of computer-based crises information systems.

To Ensure Quality

'Testing' Name of Game at Centronics

By Molly Upton
Of the CW Staff

HUDSON, N.H. – Testing and quality assurance are the name of the game in the Centronics Data Computer Corp. plant here.

About 28 feet of the assembly area are devoted to assembly of the product, and the rest of the area of the large plant is used for repeated testing of the product on various levels.

Mini ovens encase printers for burn in.

Every board is tested with the aid of a minicomputer.

Model 104 With Four Heads

Centronics buys the basic mechanisms from Brother in Japan and maintains a sizable inventory in order to be able to respond quickly to large OEM orders.

An increasing portion of the board assembly work is being done in Puerto Rico, explained Hank Weiss, director of marketing, and the plant here is pleased with the quality, he said.

Centronics designs its own boards and LSI chips and makes its own heads.

After the boards are assembled and checked, they are run through an oven and then tested with a minicomputer. Each board is tested, said David Felton, director of quality assurance.

For some OEMs, the boards are exercised by the OEM equipment at a subassembly level.

When assembled in a chassis with a power supply, the units are tested again, after which the chassis undergoes a 48-hour "burn in" and another check out.

When the chassis and the mechanism are put together, a rigorous series of tests begins. If a printer is found to be defective at any time, it is rerouted back to the source of the trouble.

Final Assembly Test

Printers undergo fine tuning of electronics and mechanism.

Fine Adjustment

After a technician performs a final test on the assembly, the unit then undergoes fine adjustment by both mechanical and electronic technicians and then on to the inspection department for both visual and computer-generated test patterns.

The units undergo burn in enclosures that trap the heat generated by the machine.

Then they are subjected to a computerized test process again, and the results are compared with those before the burn-in process.

They also go through the torture part of the room where there are a vibration table and power fluctuations.

At nearly the end of the line, one mini tests four lines from the printers for proper language configuration as well as print quality. A buffer data test and a print test for those characters most likely to have problems are performed and variable line length, paper tension and variable speeds are tested also.

The printout shows a pass or fail on each aspect tested. Then the units are tested to the OEM configuration and tested after the covers are placed on the machine.

The life testing of machines is done in the quality assurance department, and each glitch in a machine is carefully recorded, Weiss said.

Centronics maintains a central dispatch office controlling calls made by more than 50 service centers run by either Centronics or third-party personnel, Weiss said.

This gives the firm statistics on the types of calls made and the response time. About 15% of Centronics' installed base is handled through this office, he said.

In addition, Centronics is starting a remote diagnosis system, he said. Out of 10 calls received in one day, only in four instances was a servicemen dispatched, he said.

The customers themselves call in and put the system on-line, and Centronics engineers can determine whether the problem is in the line, the printer or some other part of the system.

CW Photos by M. Upton

Assembly line handles different models. At the left is a 306 with one print head, at right is a 102A with two heads.

Printers undergo final performance exam under computer control.

Smith Named to Basic Four Presidency

IRVINE, Calif. – Basic Four Corp. has a new president, T.J. Smith, and its former president, A.M. Cosentino, has become chairman of the board.

Smith was formerly executive vice-president and director of Sycor Inc., manufacturer of distributed data entry and processing systems.

Basic Four, a subsidiary of Management Assistance, Inc., markets small business systems and had sales totaling $30 million during the first nine months of 1975.

Other Moves

■ Ronald D. Schmidt has been appointed vice-president and general manager of the Printer Products Division at Computer Peripherals, Inc.

■ Roy F. Higginbotham has been named president of Datatype Corp.

■ Douglas A. Davidson has been elected senior vice-president and Joe R. Brooks has been appointed controller of U.S. operations of Mohawk Data Sciences Corp.

■ Robert C. Kibler has been named vice-president and treasurer of Greyhound Computer Corp.

■ Herbert D. Montgomery has been named division vice-president and controller for the Peripheral Equipment Division at Pertec Corp.

Executive Corner

■ Fred W. Morris has been elected vice-president of corporate development and a director of Comnet General Corp.

■ Harold H. Rumph has been appointed vice-president of marketing for the Equipment Products Group of Memorex Corp.

■ Dr. Philip S. Abrams has been elected vice-president of development at Scientific Time Sharing Corp.

■ Thomas M. O'Brien Jr. has been named vice-president of marketing of General Computer/Systems, Inc.

■ Harold Feinleib has been elected a vice-president of National CSS, Inc.

■ Benjamin F. Mathews has been named vice-president of finance and a member of the corporate finance committee at Computer Network Corp.

■ Gary O. Van Dyke has been named vice-president of information technology development at Informatics, Inc.

■ Francis E. Girard has been appointed vice-president of marketing at Keydata Corp.

■ Bruce D. Shapley has been appointed president of K/Tronic, Inc., replacing John A. Buchanan, who was named president of Technology Service Corp.

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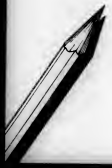

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HP '75 Revenues Rise 11%, Earnings Dip

PALO ALTO, Calif. – Preliminary figures indicate Hewlett-Packard Co.'s (HP) 1975 results were as expected – an 11% increase in sales and a slight decline in earnings.

Two firsts for the year occurred: orders surpassed the $1 billion mark and international business exceeded domestic business, according to William R. Hewlett, HP president.

For the year, sales totaled $982.7 million compared with $884.1 million last year, while earnings totaled $83,957,000 or $3.04 a share compared with $84,022,000 or $3.08 a share in 1974.

In October, the firm had projected about a 10% increase in sales, with earnings either a little above or a little below those of 1974, Hewlett said.

Earnings as a percentage of sales dropped from 9.5% in 1974 to 8.5% in 1975. "Contributing to the decline was a marked increase in our research and development expenditures," Hewlett said.

HP spent $89.5 million on R&D in 1975, up 27% from last year. HP will be introducing "a number of important new products to the market in 1976 that are expected to add a substantial increment to sales volume," he said.

Reduced profit margins in the hand-held calculator business also affected 1975 earnings, Hewlett said.

Incoming orders in 1975 totaled $1.002 billion, up 12% from $893.2 million last year.

Results for the fourth quarter showed sales of $276.4 million, up 13% over the 1974 figure of $244.8 million, while earnings fell to $21.3 million or 77 cents a share compared with $26 million or 94 cents a share in the same period last year.

The 1975 figures are tentative and have not been completely audited.

Incoming orders in all quarters were above the comparable quarters for the previous year, with the largest increase in the fourth quarter. Orders in the fourth quarter totaled $249.2 million, up 23% over the year-ago quarter.

International orders for the year totaled $502.1 million, up 18% from $425.2 million in 1974. Domestic orders rose 7% to $500.4 million from nearly $468 million last year.

Dataproducts Net Up 2%

WOODLAND HILLS, Calif. – Although Dataproducts Corp.'s second-quarter revenues were 4% lower than in the year-ago period, earnings eked up 2%.

More importantly, the second quarter showed progress over the preceding first quarter, according to the firm's President, Graham Tyson.

Revenues in the second quarter were up 8% over those of the first quarter and earnings from operations were up 41%.

Current signs indicate improved business conditions within the computer industry, Tyson said. New orders have improved and backlog has increased modestly to $36.5 million, he added.

Earnings for the second quarter ended Sept. 27 increased to $1.4 million or 21 cents a share from $1.37 million or 20 cents a share a year earlier.

Revenues dropped to $20.2 million compared with $21.1 million in the same period last year.

For the six months, earnings rose to $3.1 million or 46 cents a share compared with $2.8 million or 41 cents a share in the year-ago period.

Revenues decreased, however, to $38.9 million compared with $42.6 million last year.

The 1974 periods were restated to treat Data Card as an unconsolidated subsidiary.

Centronics Reaps 10% Quarter Rise

HUDSON, N.H. – Centronics Data Computer Corp.'s first-quarter earnings rose 18% on a 10% increase in revenues over the results for the same year-ago period, and the firm's President, Robert Howard, told shareholders he expects a record second quarter.

Revenues rose to $11.2 million compared with $10.2 million in the year-ago period while earnings jumped to $2.1 million or 45 cents a share compared with $1.8 million or 38 cents a share.

"Our company's prior investment in its future has started to materialize this quarter," Howard said.

"Our domestic and international marketing efforts have produced increases in orders and firm commitments for products from most of our customers. The broad industry cross-section of these increases indicates to us the beginning of a potential growth period," he said.

"Since the end of fiscal 1975 our debt has been reduced from $11 million to $6.5 million, which was primarily the result of improved collection of receivables and a continued reduction in inventory," Howard said.

"Improved earnings in future quarters should be expected if the current trend in sales continues," he added.

Earnings Reports

PERTEC
Three Months Ended Sept. 26

	1975	1974
Shr Ernd	$.27	$.11
Revenue	12,545,000	10,002,000
Earnings	$74,000	341,000

CONRAC
Three Months Ended Sept. 30

	1975	1974
Shr Ernd	$.62	$.46
Revenue	21,766,000	19,365,000
Earnings	843,000	625,000
9 Mo Shr	1.82	1.62
Revenue	64,729,000	60,508,000
Earnings	2,453,000	2,181,000

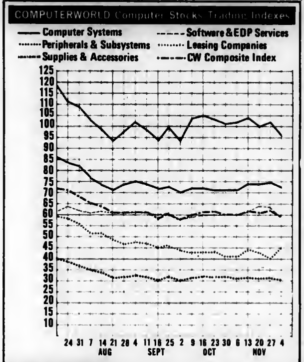
SANDERS ASSOCIATES
Three Months Ended Oct. 24

	1975	1974
Shr Ernd	$.20	$.10
Revenue	49,318,000	38,382,000
Tax Cred	275,000	104,000
Earnings	915,000	a434,000

a-Includes $324,000 gain on sale of a manufacturing facility.

SYSTEMS ENGINEERING LABS
Three Months Ended Sept. 26

	1975	1974
Revenue	$2,842,199	$4,525,215
Loss	542,439	109,819



tTEK
Three Months Ended Sept. 26

	1975	1974
Shr Ernd	$.01	.....
Revenue	49,692,000	$47,028,000
Earnings	35,000	a(969,000)
9 Mo Rev	145,672,000	143,284,000
Loss	434,000	$10,000

a-Includes write-off of $400,000 for disposal of certain manufacturing equipment.

GRAPHIC CONTROLS
Three Months Ended Sept. 30

	1975	1974
Shr Ernd	$.53	$.40
Revenue	10,107,000	10,069,000
Earnings	a521,000	332,000
9 Mo Shr	1.75	1.46
Revenue	30,895,000	29,220,000
Earnings	b1,575,000	1,207,000

a-Includes $69,000 gain from sale of Canadian property. b-Includes $58,000 gain from sale of an investment.

CONTROL DATA
Three Months Ended Sept. 30

	1975 (000)	a1974 (000)
Shr Ernd	$.58	.....
Revenue	310,224	$265,228
Spec Cred	100	150
Earnings	10,036	(6,681)
9 Mo Shr	1.94	1.14
Revenue	891,604	817,958
Spec Cred	300	650
Earnings	32,777	19,312

a-Restated to reflect accounting change.

SYCOR
Three Months Ended Sept. 28

	1975	1974
Shr Ernd	$.65	$.54
Revenue	15,309,000	10,337,600
Tax Cred	330,500	585,000
Earnings	1,887,700	1,497,800
9 Mo Shr	1.57	1.33
Revenue	39,621,000	29,466,100
Tax Cred	997,000	1,450,000
Earnings	4,451,100	3,695,600

MEDICAL COMPUTER SYSTEMS
Three Months Ended Sept. 30

	1975	a1974
Shr Ernd	$.15	$.11
Revenue	1,864,824	1,597,725
Tax Cred	191,000	146,000
Earnings	405,227	308,235
9 Mo Shr	.40	.33
Revenue	5,394,190	4,512,076
Tax Cred	511,000	422,000
Earnings	1,085,502	890,827

a-Restated to reflect accounting change for R&D costs.

Computerworld Sales Offices

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 3, 1975

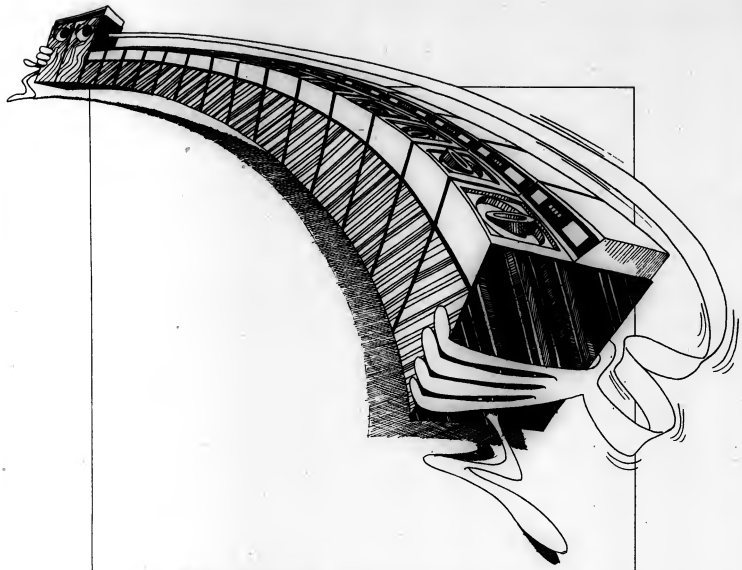
All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		1975 RANGE (1)	CLOSE DEC 3 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	62-119	81 3/4	-1 7/8	-2.2
O	COMPUTER AUTOMATION	2- 11	9 7/8	0	0.0
N	CONTROL DATA CORP	11- 23	17 5/8	-1 5/8	-8.4
N	DATA GENERAL CORP	10- 39	33 1/8	-3 1/4	-8.9
O	DATAPOINT CORP	6- 26	22 1/4	- 3/4	-3.2
O	DIGITAL COMP CONTROL	1- 4	1 3/4	- 1/4	-12.5
N	DIGITAL EQUIPMENT	46-140	127 1/2	-5 1/4	-3.9
N	ELECTRONIC ASSOC.	2- 3	2	- 3/8	-15.7
A	ELECTRONIC ENGINEER.	4- 10	7 1/2	- 1/4	-3.2
N	FOXBORO	23- 42	27	-1	-3.5
O	GENERAL AUTOMATION	4- 14	5 3/8	+ 1/2	+10.2
O	GRI COMPUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-PACKARD CO	59-120	93 3/4	-2	-2.0
N	HONEYWELL INC	22- 41	32 5/8	-1 1/2	-4.3
N	IBM	199-226	219	-5 3/8	-2.4
O	MCARDEX	1- 10	7 3/4	- 3/4	-9.4
O	MICRODATA CORP	2- 9	7 3/4	- 1/2	-6.3
O	MODULAR COMPUTER SYS	9- 19	9 1/4	-1	-9.7
N	NCR	18- 39	22	-3 1/4	-12.8
O	PRIME COMPUTER INC	2- 6	3 3/4	- 1/2	-11.7
N	PERKIN-ELMER	16- 30	22	-4	-15.3
N	RAYTHEON CO	26- 49	43 3/4	-2 1/4	-4.9
N	SINGER COMPANY	8- 17	9 7/8	- 1/8	-1.2
N	SPERRY RAND	26- 49	34 3/4	-1 3/8	-3.9
A	SYSTEMS ENG. LABS	1- 4	3 5/8	- 5/8	-14.7
N	VARIAN ASSOCIATES	7- 14	12 3/8	- 3/8	-2.9
N	WANG LABS.	7- 17	4 7/8	- 1/2	-4.4
N	XEROX CORP	47- 86	47 1/4	-4 3/8	-9.4
	LEASING COMPANIES				
O	COMDISCO INC	1- 5	3 7/8	+ 1/2	+14.5
A	COMMERCE GROUP CORP	2- 4	2 3/8	- 1/8	-5.0
A	COMPUTER INVSTRS GRP	1- 2	3/4	+	+8.0
M	DATRONIC RENTAL	1- 1	1/2	0	0.0
A	DCL INC	1- 1	3/8	0	0.0
N	DPF INC	3- 6	4 3/8	- 1/8	-2.7
O	EDP RESOURCES	1- 2	1	0	0.0
A	GRANITE MGT	1- 5	4 1/2	0	0.0
A	GREYHOUND COMPUTER	2- 3	2 5/8	- 1/8	-4.5
N	ITEL	3- 4	9 1/2	- 5/8	-13.2
N	LEASCO CORP	4- 4	5 1/2	0	0.0
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	MRC INC	0- 4	1/2	0	0.0
A	PIONEER TEX CORP	2- 7	4 3/4	- 1/4	-5.0
A	ROCKWOOD COMPUTER	1- 1	1/4	0	0.0
N	U.S. LEASING	7- 14	7	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

EXCH		1975 RANGE (1)	CLOSE DEC 3 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 1	7/8	- 1/8	-12.5
A	APPLIED DATA RES.	1- 10	1 1/4	- 3/8	-23.0
N	AUTOMATIC DATA PROC	29- 65	52 1/4	-7	-11.8
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	COMPUTER DIMENSIONS	2- 6	3 1/4	- 1/4	-7.1
O	COMP ELECTION SYSTMS	3- 7	9	- 1/2	-4.0
O	COMPUTER HORIZONS	1- 1	3/4	0	0.0
O	COMPUTER NETWORK	1- 3	2 1/4	- 1/2	-18.1
N	COMPUTER SCIENCES	2- 4	4	- 1/4	-5.9
O	COMPUTER TASK GROUP	1- 1	3/4	0	0.0
O	COMPUTER USAGE	2- 4	2 3/8	0	0.0
O	COMSHARE	3- 6	2 5/8	- 3/8	-12.5
O	DATATAB	1- 2	1	- 1/8	-11.1
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	11- 29	11 1/4	-2 1/4	-15.9
O	INFORMATICS INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	5/8	0	0.0
O	KEANE ASSOCIATES	2- 3	2 5/8	0	0.0
O	KEYDATA CORP	2- 4	3 7/8	+ 3/8	+10.7
O	LOGICON	3- 5	3 3/8	0	0.0
A	MANAGEMENT DATA	1- 3	1 3/8	0	0.0
A	NATIONAL CSS INC	6- 14	9 7/8	- 7/8	-9.1
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	9- 17	12 3/8	-1 3/8	-10.0
N	PLANNING RESEARCH	2- 4	2 3/4	- 1/4	-9.3
O	PROGRAMMING & SYS	1- 1	1/2	- 1/8	-23.0
O	RAPIDATA INC	2- 5	3 7/8	- 3/4	-16.2
O	REYNOLDS & REYNOLDS	10- 24	12 3/4	-1	-7.2
O	SCIENTIFIC COMPUTERS	1- 1	1	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1 1/8	0	0.0
O	TYMSHARE INC	7- 21	18 3/4	-1	-5.0
A	URS SYSTEMS	2- 4	2 7/8	- 1/8	-4.1
N	WYLY CORP	2- 4	2 7/8	- 1/8	-4.1
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	4- 9	7 5/8	-1 5/8	-17.5
O	ADVANCED MEMORY SYS	1- 7	3 7/8	- 5/8	-13.8
N	AMPEX CORP	3- 7	8	0	0.0
O	ANDERSON JACOBSON	1- 3	1 3/4	- 1/8	-6.6
O	ARCHIVE MEDICAL ELEC	1- 5	3 1/8	+ 1/8	+4.1
A	BOLT,BERANEK & NEW	4- 13	6 5/8	- 5/8	-8.6
N	BUNKER-RAMO	4- 9	3 7/8	0	0.0
A	CALCOMP	3- 7	3	- 1/2	-14.2
O	CAMBRIDGE MEMORIES	1- 9	1 1/2	- 1/4	-14.2
N	CENTRONICS DATA COMP	7- 29	18 1/4	-2	-9.8
O	CODEX CORP	15- 38	31	-6 1/2	-17.3
O	COGNITRONICS	1- 2	3/4	0	0.0
O	COMPUTER COMMUN.	1- 2	1	0	0.0
O	COMPUTER CONSOLES	3- 7	3 3/4	0	0.0
A	COMPUTER EQUIPMENT	1- 2	1 1/4	- 1/8	-9.0
O	COMPUTER MACHINERY	1- 2	5/8	- 1/8	-16.6
O	COMPUTER TRANSCEIVER	1- 2	1	+ 1/8	+14.2
O	COMTEN	2- 5	3 3/8	- 5/8	-14.6
N	CONRAC CORP	12- 30	25 1/4	-3 3/4	-12.9

EXCH		1975 RANGE (1)	CLOSE DEC 3 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	1- 3	2	+ 1/4	+14.2
O	DATA 100	9- 16	8	- 7/8	-8.8
A	DATA PRODUCTS CORP	2- 6	3 3/4	- 3/8	-9.0
O	DATA TECHNOLOGY	1- 3	1 1/4	- 1/8	-9.0
O	DATUM INC	1- 2	5/8	- 1/8	-14.6
O	DECISION DATA COMPUT	2- 7	2 3/4	+ 1/2	+22.2
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DIZAN CONTROLS	1- 1	3/4	0	0.0
N	ELECTRONIC M & M	1- 3	1 1/4	- 1/8	-9.0
O	FABRI-TEK	1- 1	3/4	0	0.0
O	GENERAL COMPUTER SYS	1- 2	2 1/4	+ 3/4	+50.0
N	HAZELTINE CORP	3- 6	3	- 1/8	-4.0
N	HARRIS CORP	19- 33	28 7/8	-3 7/8	-11.8
A	INFOTERM CORP	3- 12	7 3/4	-1 1/4	-13.8
O	INFOREX INC	2- 5	2 1/2	- 1/4	-9.0
O	INFORMATION INTL INC	8- 14	10 5/8	-1 3/8	-11.4
A	LUNDY ELECTRONICS	3- 4	4 5/8	- 3/4	-13.8
O	MANAGEMENT ASSIST	1- 1	1/2	0	0.0
A	MILGO ELECTRONICS	9- 24	19 1/4	-1 1/2	-8.9
N	MOHAWK DATA SCI	1- 9	2 3/4	- 1/4	-8.3
O	OPTICAL SCANNING	1- 3	1 7/8	- 3/4	-28.8
O	PENRIL CORP	2- 2	1	0	0.0
O	PERTEC CORP	2- 9	3 3/4	- 1/8	-3.2
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	1- 1	1/2	0	0.0
O	QUANTOR CORP	2- 6	3 7/8	- 3/8	-8.8
O	RECOGNITION EQUIP	2- 9	8 1/8	-1	-16.3
N	SANDERS ASSOCIATES	3- 11	6 1/2	- 1/4	-3.7
O	SCAN DATA	1- 3	1 1/2	+ 1/4	+20.0
O	STORAGE TECHNOLOGY	6- 17	8 3/8	- 7/8	-8.5
O	SYCOR INC	9- 22	17 1/2	- 3/4	-4.1
O	T BAR INC	3- 6	6 1/4	0	0.0
O	TALLY CORP.	1- 5	2 1/2	- 1/8	-4.7
O	TEC INC	1- 4	2	0	0.0
N	TEKTRONIX INC	19- 45	41 1/4	-3	-6.7
N	TELEX	1- 3	2 1/8	+ 1/8	+6.2
O	WANGCO INC	4- 8	7 3/8	- 1/8	-1.6
O	WILTEK INC	1- 4	1	0	0.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	6- 8	4 1/2	0	0.0
A	BARRY WRIGHT	5- 7	5 5/8	+ 1/4	+4.6
O	CYBERMATICS INC	0- 1	3/8	0	0.0
A	DATA DOCUMENTS	29- 42	31 1/4	- 3/8	-1.1
O	DUPLEX PRODUCTS INC	12- 25	17	+ 5/8	+3.8
N	ENNIS BUS. FORMS	5- 7	5 1/2	0	0.0
O	GRAHAM MAGNETICS	9- 11	8 3/4	-1	-10.2
O	GRAPHIC CONTROLS	9- 21	12 1/2	- 1/2	-3.8
N	3M COMPANY	49- 69	59 1/2	-2 3/8	-4.4
O	MOORE CORP LTD	39- 51	46 3/4	-2	-4.1
N	NASHUA CORP	9- 22	9 7/8	- 1/2	-4.9
O	STANDARD REGISTER	11- 23	16	- 1/4	-1.4
O	TAB PRODUCTS CO	4- 9	5	- 1/4	-4.7
N	UARCO	17- 24	19 3/4	-1 1/4	-5.9
O	VARIER GRAPHICS CORP	4- 7	4 3/4	- 1/4	-4.3
A	WABASH MAGNETICS	3- 5	3 5/8	- 1/8	-3.3
N	WALLACE BUS FORMS	15- 25	18 1/4	+ 1/4	+1.3



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